# agriculture

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MONTHLY

The Countryside—as I see it page 451

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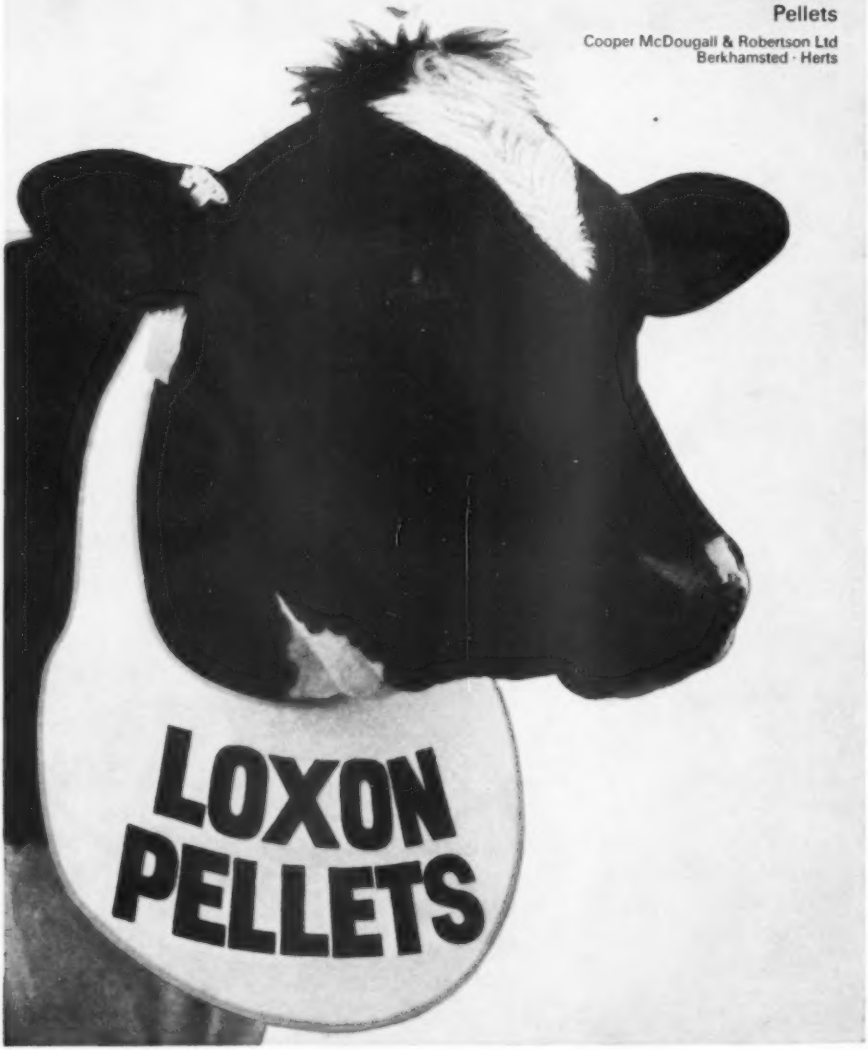

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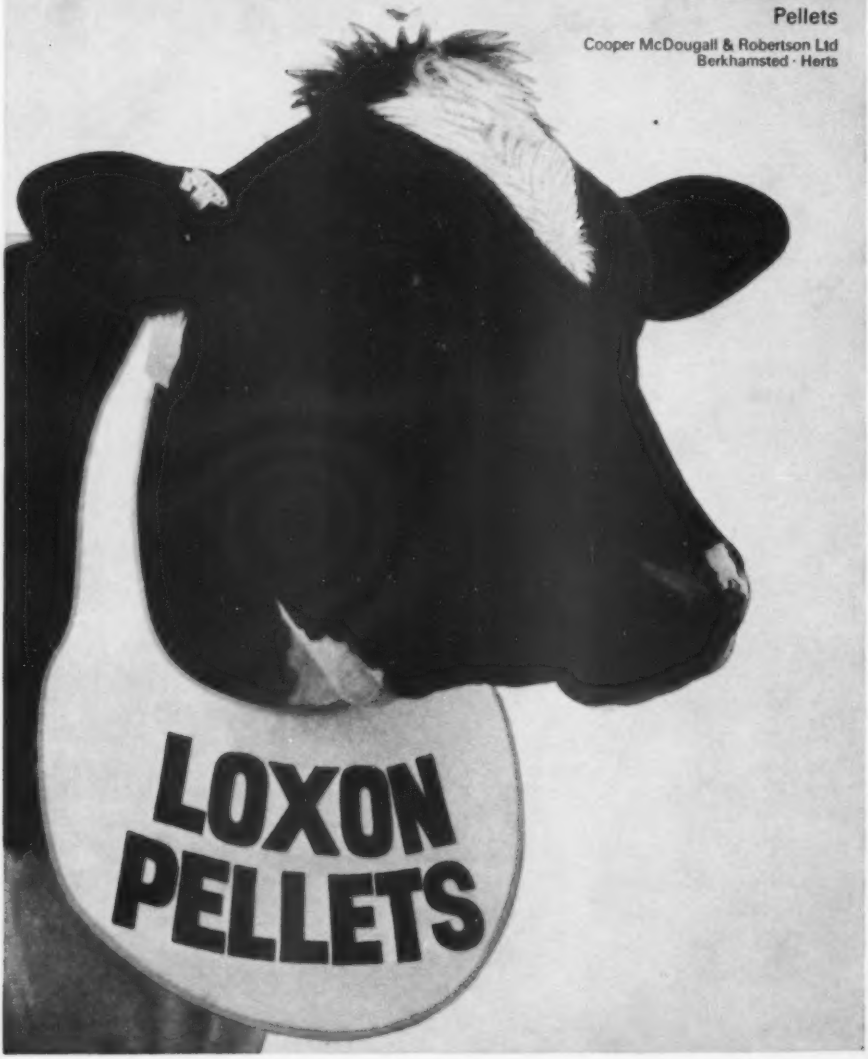

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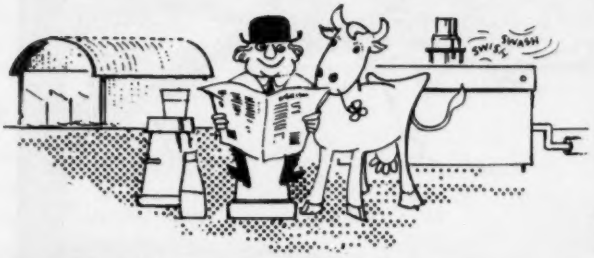


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# Agriculture

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*David King of Mona Farm, Necton, Norfolk, talking to Robert Goodall of ICI, last July. David has 182 of his 850 acres to winter wheat and has averaged £40 an acre gross margin over the past few years.*

# £40 an acre isn't too bad - but we're not satisfied

**David King says:** In order to save time and labour we normally sow two consecutive winter wheat crops on the same land. For the first crop I combine-drill 2 cwt. of ICI No. 3 (9.25.25) and top-dress with 2½ cwt of 'Nitram' (34.5%N). A total application of 105 units of N, 50 units of P and 50 units of K.

For the second year we naturally increase the application–using 3 cwt of No. 3 followed by 3 cwt of 'Nitram' as top-dressing. This increases the totals to 130 units of N, 75 units of P and 75 units of K. In this way I have maintained a pretty constant gross margin of £40 per acre which isn't a bad figure after all. But as I said to Robert Goodall of ICI, I'm not satisfied yet. He agrees with me and we're working at it together.

Winter wheat isn't our only crop by any means. On the other 650-odd acres we grow barley, beet, potatoes, peas, beans, kale seed and strawberries. Plus a pig-breeding unit which, at present, is 100 sows. With that many problems on your hands you're glad of a simple straightforward range of fertilizers like the ICI range. And you're glad of someone like Robert to talk your ideas over with–and to help you with specialized things like fertilizer handling systems, spreader testing and even computer programming.

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# The Countryside
## — as I see it

**J. D. F. Green**

THE countryside I see is an artifice. There is little that is natural about what is probably man's most moral work of art. Properly handled it gives little scope for greed, caprice or indifference. Improperly handled it extracts its own retribution with a remorseless certainty. No nation can neglect its countryside because its character is indelibly written into it quite as much as its sustenance depends upon it. A countryside not farmed, not dedicated to its primary use, is a wilderness. Good farming, therefore, is never ugly.

In my own lifetime I have seen the British countryside triumph over two hostile blockades. I saw it reach the nadir of economic neglect in the middle 'thirties, so much so that its rehabilitation at the time of Chamberlain's Kettering speech in 1938 seemed well nigh impossible. Then followed the stark cost of its revival in subsidies and capital injections. I have since lived to see it rate technologically amongst the most advanced agricultures in the world, providing 70 per cent of the temperate food requirements of its fifty million peoples. During this time I have known farmers, humble and dedi-

cated, arrogant and rich, peevish and uncertain of themselves. Their fellow countrymen have respected and resented them in turn but upon their moods and endeavours the appearance of the countryside has essentially depended.

Ignored by human will, land would, depending upon its geography, resemble little more than a moon crater or a swamp; man gives it its character. Land may be so poor that it will carry only one sheep to twenty-five acres, but it derives warmth and fascination from so doing. The great outbacks of the world like Western Queensland and Patagonia have a character of their own. So, too, have the wheat belts of Canada and the western United States. Intensively farmed areas like the Imperial Valley in California and the irrigation lands of Arizona have their own fascination. I have found this same fascination in the Cambridgeshire fens when the late Arthur Rickwood grew carrots and potatoes on land already rich and with a high water table which had been further fattened by tons of pig manure. There is always charm in abundance.

## Changing breeds

Clearly man's most gracious additions to his countryside are his domestic livestock. It is a tragedy that many of the world's noblest breeds are disappearing and the rest will never look the same in intensive houses as they did on their natural pastures. We have seen the decline of the long wool sheep in England, particularly folded in hurdles. The Lincoln breed has virtually gone and the Oxford Down, which I kept myself for many years, remains largely a memory. I still have a few new ash hurdles cut from my own woods which I cherish as a memento. Of course, many of our mountain breeds survive on hill sides to which they are hefted.

The same story is true of cattle. The Gloucester cow will never be seen again among the Severn cider orchards, nor the Longhorn in the Midland pastures where the clash of their horns as they grazed side by side were like the spars of ships rubbing in the still of the evening. Nevertheless, we have brought other breeds of great beauty to this country in recent years, particularly the Charolais. We may still see the Hereford grazing in meadowlands beside the Wye, even if most are in feedlots, cross bred and polled. Black and white cattle are appropriate among the white boards and red pantiles of eastern England even if they are less so in white asbestos halls ringed with transformer poles and unsightly pylons. Ultimately, if all our livestock goes indoors we shall have set ourselves a new problem, but it will be one for the architect and not the farmer.

## Moulding taste

Fortunately, taste is an easily developed faculty: what the farmer must do is to mould the taste of the conservationist, to show him that there is no absolute quality of wildness. Farming is something that is merely more or less extensive. So there is no inherent ugliness, even in weeds. A weed is a plant out of place and I, personally, find a poor crop of potatoes struggling on an upland of Wiltshire chalk as distasteful to see as a bed of nettles, which at least favour butterflies and moths. Likewise a dairy herd cliff-hanging among bracken on the slopes of a Yorkshire dale is to me uncomfortable. A rusty Dutch barn is not acceptable because it is familiar, while a well-shaped silo giving better elevation is ugly. The role of function and

economy applies to farming as to all art. Sentiment is the bane of art. I collect farm implements because I am an historian and they give technology a pedigree, but I do not use them. To plough with oxen other than for exhibition purposes would be bad taste. The countryside is neither zoo nor museum and this is something with which we have to become reconciled, particularly in relation to our aims for greater access to the countryside.

Countryside and landscape are synonymous. The farmer works in a countryside that the tourist and conservationist calls a landscape. Landscape is an organization of space into lines and textures and tones. This is what planning is about. Some landscapes live for us particularly because of the moment of truth at which the human eye recorded them. However, there are many landscapes no less lovely than Dedham Vale which have found no Constable. Moreover, Constable revealed a countryside that was technologically very much in vogue. Dedham Mill was technically most efficient in his day.

*Near Lyme Regis, Dorset*

## Farm buildings in the landscape

What we have to learn urgently is how to fit modern farming into our countryside. If we have to house livestock in mammoth buildings these should be sited correctly, not only in relation to access but to roof pitch and contour. If a building is large its mass can be broken by the correct use of line and colour texture. The 'grain' of a countryside can be heightened by the proper use of surfaces, and the correct choice of materials and colour. Tone is something indigenous that allows for little caprice. The red sandstones and grey limestones revolt against unrelieved white asbestos. Black is a safer colour in any countryside and at any season than green. Elevations are important. There are situations in which a silo can enhance a grouping. Trees should integrate with layout as they did with domestic architecture in the eighteenth century. Their use is not merely to disguise ugliness.

The recent Farm Buildings Competition held by the Country Landowners Association revealed many insights into these matters. Natural materials accounted for the success of so many entries which were of wooden construction. In 1969 'package deal' buildings showed up badly in themselves

and often cost awards when associated with otherwise sensitive groupings—in the following year there was a marked improvement and a greater availability of acceptable components. Traditional estates had a disproportionate success over owner-occupiers and this appeared to be quite irrespective of their capital resources. It was just that the tradition of good style and better class craftmanship had lingered. Moreover this was more apparent in the West Country than in the Midlands and in eastern England.

As a farmer in an Area of Natural Beauty I can cite examples of the kinds of error that we all constantly make. A landowner whose estate is in a classic beauty spot, and whose standard of maintenance by his own building staff is exceptional, recently erected a large structure for cattle feeding on a prominent skyline. Realizing its prominence he immediately planted trees which a working farmer without a forestry staff might not have had the time or opportunity to do. The question is whether the economic life of the building will survive even the immaturity of the trees. My own farming enterprise recently erected a grain store for 1,000 tons of grain close to a village street; it now proclaims its size by an unbroken topline and unrelieved tone. I am confident that had the lessons of the C.L.A. competition been learned when this building was erected it could have actually enhanced the landscape. I have estimated that the employment of an architect and through-tone materials would have added at least 5 per cent to the cost of erection but at the same time would have reduced maintenance.

A more glaring example in my part of the world is a row of five silos arranged in a line on a cramped site against a particularly picturesque hillside. The farmer here cannot be blamed for the inappropriateness of the proprietary colour, but the siting has been criticized by conservationists who resent farmers having freedom from planning control.

Should farming be subject to planning control? Conservationists will continue to press for it and farmers to oppose it. I doubt myself whether, as a class, we farmers should be allowed complete freedom to erect buildings with more than a ten-year life which bear no relationship to the area of land they serve. The estimated life of the buildings and their appropriateness to the farmed area is, I think, more important than their size, particularly now that we have lost the protection of the 'prudent landlord' concept.

## Changing pattern

Finally, we come to the appearance of farming itself, to the change in the pattern of our countryside brought about by new techniques and to the effects on widlife. I think we rather tend to frighten ourselves by rattling chains in the night. There is a certain childishness about the Jeremiahs who preach woe at all our farming conferences. What in fact has happened? The 100 h.p. tractor obviously behaves differently from the 20 h.p. tractor in terms of the width of the implements it draws and the space it requires for turning and loading. The 7 ft tractor-drawn combine is very different from one of 18 ft and self-propelled; and I even regret that few in Britain use the latter because of our lanes and gateways.

The countryside today must look very different from the horse-dominated countryside which existed when the war began in 1939. Field size, hedgerow timber, walls and ditches have been irreversibly altered. However, the farmer who creates a prairie in Britain thinking he is being efficient is not only foolish but ignorant of many important scientific facts about micro

climates and even ergonomics. Field size increases and straight shelter belts give way to isolated tree lots. The landscape is modified but not destroyed; but Lincolnshire still does not look like Gloucestershire and never will.

What I think makes farming look so monotonous is the paucity of economic crops that are available to the modern farmer. Short term economic objectives too often distort the pattern of farming. This is as bad for landscape as it is for wild life. If the relative value of crops could be maintained for longer periods farmers would automatically evolve more balanced and even classical systems based upon proper considerations of land use.

If short term economic issues are at fault in coercing farmers in the wrong direction, long term plans should be able to take account of landscape and land use considerations. It is not technology that is at fault if land is being driven beyond its productive capacity. It is prices and the population explosion and the plight of urban society. The same phenomena that produces 'access to the countryside' and requires beauty for the soul demands also an extractive agriculture. It equates the land with the mine that brought the city into being. It is little wonder that city dwellers will want to eat the seed corn until they are educated otherwise.

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The author, **J. D. F. Green, M.A.**, is a Barrister at law and Chairman of the Gloucestershire Branch of the Council for the Protection of Rural England. He has held many posts connected with general aspects of farming.

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## CEREALS FOR AUTUMN SOWING

### SEED TESTING FACILITIES FOR FARMERS

Farmers intending to use cereal seed of their own growing, or yearling seed which has been stored on the farm, are advised to have it tested for germination before it is sown.

Each sample for testing should be drawn in accordance with the Seeds Regulations, 1961, so as to be representative of the whole bulk and should consist of not less than eight ounces (exclusive of wrappings). The sample should be sent to the Chief Officer, Official Seed Testing Station, Huntingdon Road, Cambridge, preferably in the standard type of packet obtainable from the Station. Each sample should be accompanied by a remittance (not coin) for the fee of £1 4s. (barley, rye and wheat) or £1 12s. (maize and oats). For the 'rapid' priority service the full fee plus 50 per cent must be paid, i.e., £1 16s. for barley, rye and wheat; £2 8s. for maize and oats. The following particulars should be given on the outside of the packet:

(1) Full name and postal address (including county) of the sender.

(2) Date of dispatch of the sample.

(3) Kind and variety of the seed and particulars of any chemical dressings that may have been used on it.

(4) Sender's reference number, or mark, if several samples of any one variety are sent.

**Recently published figures of food supplies and consumption answer the question**

# How much do we eat?

REVISED estimates of food supplies in the United Kingdom for 1966–1969, together with the estimated energy value and nutrient content, have been published in full in the Board of Trade Journal.* Here we give a thumb-nail sketch of what the figures show to be some of the trends in what we eat and drink. The comparisons made are between 1968 and 1969 unless otherwise stated.

To give the average supplies available per head per annum for the various groups of commodities, the figures for the total supplies, after deducting exports, wastage and non-food uses, are divided by the estimated population (Table 1). These are the only official estimates of the food consumption of the population as a whole and enable the overall food position to be compared over different periods of time.

**Table 1**

**Summary of Food Supplies per head per annum moving into consumption in the United Kingdom**

(lb per head per annum)

| | 1966 | 1967 | 1968 | 1969 |
|---|---|---|---|---|
| Dairy products (excluding butter) (as milk solids) | 56·5 | 56·4 | 56·3 | 56·1 |
| Meat (including canned meat, bacon and ham) (as edible weight) | 129·5 | 131·6 | 131·6 | 130·7 |
| Fish (edible weight) | 19·4 | 19·9 | 20·8 | 19·8 |
| Eggs and egg products (number) | 269 | 274 | 275 | 271 |
| Oils and fats (visible) (fat content) | 50·5 | 49·9 | 50·9 | 51·2 |
| Sugar and syrup (sugar content gross) | 117·6 | 115·8 | 115·3 | 117·6 |
| Fruit (as fresh equivalent) | 123·4 | 118·0 | 122·9 | 122·8 |
| Pulses and nuts | 12·3 | 12·6 | 12·2 | 13·2 |
| Potatoes | 224·0 | 223·5 | 226·5 | 217·7 |
| Other vegetables (as fresh equivalent) | 137·0 | 136·2 | 135·2 | 136·8 |
| Grain products | 168·9 | 161·2 | 161·6 | 162·7 |
| Tea | 8·7 | 9·1 | 8·8 | 8·5 |

## Dairy products

The overall drop of 0·4 lb per head between 1966 and 1969 in the consumption of these products was due almost entirely to a continued decline in the amount of liquid milk taken. This fell by 4·5 pints per head, mainly

*Board of Trade Journal, Vol 199, No. 3829.

because of changed arrangements introduced in September 1968 which relieved local education authorities of the duty to provide free milk to certain categories of school children. Many more housewives now buy cream each week, consumption having more than doubled during the past ten years. This reflects both the increase in the standard of living and the fact that the average price paid by housewives has declined in 'real' terms (that is, after allowing for the fall in value of money). More cheese is being eaten, reaching 11·3 lb per head in 1969, almost one-third of a pound higher than a year earlier. The 'real' price of cheese has been falling for some years, and the growth in purchases of natural cheese has more than offset a weakening demand for processed varieties.

## Meat

Supplies of beef and veal increased in 1969, mainly because of a recovery in imported supplies following the lifting of restrictions imposed in 1968 during the foot-and-mouth epidemic; and the share contributed by imports of boneless meat also increased. Consumption of mutton and lamb, however, fell from 23·2 lb in 1968 to 21·6 lb in 1969, the lowest level since 1952; a reduction in home supplies was accentuated by adverse weather conditions, and although prices were steady the long-term downward trend in domestic demand was clearly continuing.

Supplies of pork and poultry, nearly all of which is home-produced, continued to increase and were up by 1·2 lb and 1·0 lb per head respectively. The 'real' price of poultry has been falling for many years (even the money price in 1968–69 was lower than at any time since the 1940s) and although the market has steadily widened the proportion of housewives buying poultry is smaller than for any of the three carcase meats or for bacon or sausages. Most of the fall of 1·9 lb in meat offals resulted from the revised allowance for offal not used for human consumption. Imported canned meat fell to the lowest level since 1965 (7·0 lb per head) and bacon and ham by 0·2 lb to 25·0 lb per head.

## Fish

Diminished imports of canned fish and a fall in supplies of fresh fish reduced total fish consumption by 1 lb per head.

## Eggs

We ate four less eggs, at 248 per head, in comparison with the peak level of 252 in 1968. The demand no longer responds much to changes in 'real' prices or in levels of income, and there are signs that the underlying demand may be weakening.

## Oils and fats

Total oils and fats showed a slight increase because of small gains by margarine, lard and compound cooking fats, but purchases of butter fell slightly in spite of a continuing drop in its 'real' price. As the consumption of bread decreases one would expect the use of spreading fats such as butter and margarine to decline.

## Sugar and syrups

Refined sugar use at 107·2 lb per person in 1969 was the highest since 1966, but consumption has varied only slightly during the past five years, with an increasing proportion going to manufacturers. Consumption of glucose again showed a marked increase to a new high of 11·4 lb, but honey stayed at the 0·7 lb level.

## Fruit

Average consumption of all fruit during the past decade has been 121·5 lb per head; in 1969 we consumed marginally more at 122·8 lb. Canned fruit gained in popularity while dried fruit declined. It is interesting to note that we have not eaten more fresh fruit during the last ten years in spite of the rise in the standard of living.

## Potatoes and other vegetables

Potato consumption fell from 226·5 lb to 217·7 lb per head, mainly because of a fall in home supplies. Demand for potato products continued to increase, with the frozen, dehydrated, canned and pre-packed potatoes all becoming more popular; but crisps fell from 14·6 to 13·7 lb (in raw potato equivalent) in 1969 following the imposition of purchase tax in that year's budget. Other vegetables recorded a marginal increase over the 1968 level, but growth in demand in recent years has depended on the expansion of the market for convenience foods.

## Grain products

There was little change in total consumption of grain products but cerea breakfast foods continue to gain in popularity and we ate nearly 0·3 lb per head more. The consumption of flour fell by nearly 8 lb between 1966 and 1969 mainly because of the decline in the popularity of bread.

## Tea, coffee and cocoa

We are not, perhaps, in danger just yet of changing our traditional tea drinking habit, although in 1969 we drank less tea (at 8·5 lb per head) than at any time since 1952 and consumed the highest level of coffee recorded to date (3·6 lb). At 1·1 lb there was no change in the amount of cocoa used.

## Alcoholic drinks

The continued increase in the consumption of beer became more marked in 1969 when 173·1 pints per head were recorded, a rise of 10·9 pints over 1966, of which 6·5 pints occurred between 1968 and 1969. Wine drinking had been steadily increasing until 1968, when it reached the level of 6·7 pints per head, but last year it fell back to 6·4 pints.

## Nutrient content and energy

In recent years the energy value and nutrient content of food supplies have been very stable, the proportion of energy provided by protein, fat and carbohydrate having remained almost constant since 1966. There was a slight increase in energy value between 1968 and 1969 partly due to the increase in sugar consumption. Decreases in vitamins A and D were due

partly to the reduction in the estimate of offal consumption, and reduced consumption of potatoes and of cabbages and greens accounted for the lessening of riboflavine and vitamin C content respectively. An increase in iron was almost entirely because of changes in the composition of flour.

## Consumption of products

A new table has been added to this series of estimates and shows foods measured in the form in which they are finally sold (Table 2). The foods are included in the ingredient form in Table 1; for example, the main ingredients of bread, cakes and biscuits appear in that table as part of grain products, sugar and fats.

**Table 2**

**Consumption per head of some food products as finally purchased*** (lb per head per annum)

| | 1966 | 1967 | 1968 | 1969 provisional |
|---|---|---|---|---|
| Bread | 131·1 | 134·2 | 129·4 | 127·7 |
| Flour | 21·6 | 21·1 | 19·7 | 19·4 |
| Cakes | 23·7 | 23·3 | 23·3 | 22·8 |
| Biscuits | 22·0 | 22·5 | 22·4 | 22·0 |
| Beef and veal (*a*) | 29·4 | 31·2 | 28·5 | 28·0 |
| Mutton and lamb (*a*) | 22·9 | 22·3 | 21·1 | 19·8 |
| Pork (*a*) | 10·0 | 8·4 | 9·3 | 10·2 |
| Poultry (including game and rabbits (*a*) | 16·8 | 18·4 | 20·2 | 20·7 |
| Canned meat | 10·8 | 12·0 | 12·1 | 12·4 |
| Sugar (visible) (*b*) | 60·0 | 61·1 | 58·4 | 57·8 |
| Canned vegetables | 32·0 | 33·9 | 33·8 | 35·7 |
| Frozen vegetables | 5·5 | 5·6 | 5·6 | 6·6 |
| Chocolate confectionery | 14·3 | 14·2 | 14·0 | 13·2 |
| Sugar confectionery | 11·0 | 11·3 | 11·2 | 11·4 |
| Soft drinks (pints per head) | 74·7 | 81·0 | 80·5 | 86·0 |
| Ice cream (shillings per head at current prices) | 22·5 | 25·2 | 28·1 | 30·9 |

*The ingredients of these foods are included in the quantities shown in Table 1.
(*a*) Weight as purchased; excludes usage in manufactured products, such as sausages and meat pies.
(*b*) Excludes sugar content of manufactured foods.

Amounts of sugar and flour purchased for household and catering use continued to decline, reflecting the trend of ready manufactured convenience foods. This is illustrated by the growth shown in purchases of canned and frozen vegetables and canned meats. Although total beef supplies increased in 1969, there was a decline in purchases of beef as such, as well as of lamb, although this was offset by increases for pork and poultry. There has been a tendency in recent years for the proportion of carcase meat supplies sold as joints or cuts to decline. For many years the consumption of sweets has remained at about 25 lb per head, but in 1969 sales of chocolate confectionery fell by some 6 per cent.

## Summary

The figures confirm the marked stability in the broad pattern of food supplies available for consumption. The average energy and nutrient content we derive from these supplies has also remained very steady and compares favourably with the allowances recommended by the Department of Health and Social Security.

**Performance testing plays an increasingly vital role in present day production programmes**

# Testing for a Hybrid Pig

**R. P. Charlesworth**

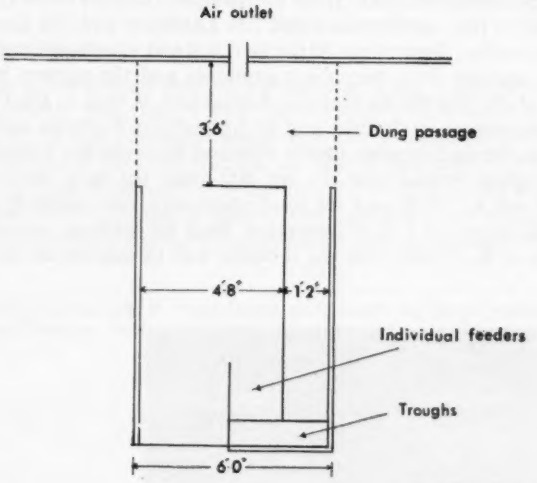
As pig production becomes more and more scientific the commercial farm unit is becoming increasingly specialized and this is leading to a new structure within the industry. Producing breeding stock is becoming more the responsibility of the large specialist organizations and their associated pedigree herds, with the farmer emerging with his husbandry expertise to produce the end product—the pork pig, quality bacon pig or the heavy hog for food manufacturing purposes. As the meat trade defines its requirements more exactly with the assistance of the long-awaited classification scheme from the Meat and Livestock Commission, it becomes increasingly important that producers should start with the right raw material. The responsibility for this lies with those who are engaged in breeding the nation's foundation stock. There have been a number of such organizations set up during the past five years primarily to fix and reproduce the now proven advantages of hybrid vigour and to make them available to the commercial pig farmer. As these companies progress, they are finding that performance testing plays an increasingly vital role in their sophisticated production programmes; with their own specialist testing units most of these concerns are successfully supplementing the work undertaken by the Meat and Livestock Commission.

## Boar testing

One hybrid pig breeding company recently erected its second Boar Testing Unit to meet the increasing demand for performance-tested boars. The new house, which is 90 ft long and 23 ft wide, has a capacity for fifty-six boars at any one time and will have an annual throughput of 224 tested Landrace boars. One of the main features of the new building is the principle of constant temperature. The company concerned considered it vital to be able to test their stock under the same environmental conditions throughout the year, so that performance data could be meaningfully compared and evaluated batch by batch, season by season. The house is maintained at a constant 18°C (65°F) by a system of automatically-controlled, variable speed fans and oil-fired heating which enters the interior of the house by a central duct in the roof.

There are two rows of fourteen pens on each side of a central feeding passage and two boars are housed in each pen. The sleeping area is 4 ft 8 in. wide by 6 ft deep and, by incorporating one of the two individual feeders

within the pen, more exercise area has been provided for the pigs. A solid floor dunging passage 3 ft 6 in. wide is sited at the rear of the pen and a nipple drinker is mounted on the pen divider wall. Air-outlet baffles are centred on the outer wall, one for each pen. The building, which will test four batches of boars per year, was designed by the directors of the breeding company and the construction work undertaken by a local firm on contract. The cost per boar housed, excluding grant, works out at approximately £65 and at that price must be a viable proposition for concerns which are involved in farm testing programmes.




*Pen layout*

## Feeding

A pair of young boars are introduced into the pen at about 65 lb liveweight and are fed *ad-lib.* until they reach 70 lb liveweight (when testing commences) on a 16·5 per cent protein pelleted ration produced locally by a farmer-controlled Milling and Mixing Group. They are individually fed twice a day using a system of colour tagging and trap penning, and in a matter of a few days the boars are completely trained to eat out of one feeder only. The ration is increased from 3 lb per day at 70 lb to a maximum of 6 lb at 180–190 lb liveweight and feeding is carefully controlled throughout. Detailed record cards are maintained for each animal, and the weights of pellets fed to each boar during testing are noted together with other data. At 200lb liveweight, when the test is complete, the boars are check-weighed and ultra-sonically measured for back-fat on the shoulder and loin, C. and K. From the record cards the daily liveweight gain and food conversion rate can be calculated, and this information coupled with visual appraisal for conformation and health constitutes the basis for selection. A strict watch is maintained by the Company's veterinary surgeon on all aspects of pig health during the testing period as part of the overall disease prevention programme. All boars receive swine erysipelas vaccine at eight weeks, twelve weeks and on completion of the test. To date, there has been no evidence of tail-biting, leg troubles or fighting and the performance figures achieved in this new unit have been excellent.

## Hardening-off

On completion of the test at 200 lb, usually at under five months of age, those boars which satisfy the high standards imposed by the Company spend a further month in conditioning pens out on concrete. These open pens are 18 ft long and 6 ft wide and have divisions constructed of strong weldmesh so that the boars can see each other. Consequently they spend the first few days chasing up and down, thus getting valuable exercise and fresh air. After this hardening-off period, designed to prepare them for all farm conditions, they are licenced at six months and sold at £60 to £130, the price being related to a performance index. There are facilities available at the Company's headquarters to fully performance test 224 Landrace and 110 Large White boars a year, and of these about 80 per cent will end up on customers' farms. All animals are free from enzootic pneumonia and the nucleus herd is on the 'A' list of the Pig Health Control Association as well as the Pig Health Scheme administered by the Ministry of Agriculture, Fisheries and Food.

In practice, the performance figures obtained from the test units have been very encouraging. Spread over the last 300 boars the daily liveweight gain has worked out at 1·7 lb and the food conversion rate currently stands at 2·5 lb of feed to put on 1 lb of liveweight. Back fat readings average 16 mm at C, 17 mm at K, 37 mm over the shoulder and 18 mm on the loin.

*Interior of new boar testing unit*

## Testing gilts

Female lines are also subjected to vigorous performance testing as part of the improvement programme. Gilts are housed in open air units with a capacity of 240 pigs at any one time, and the building has a yearly throughput of 1,000 tested females. Gilts are introduced at eight weeks of age and penned in level breed batches of ten. Testing commences at 70 lb liveweight and all pigs are individually fed. Feeding is carefully controlled, starting at 3 lb when testing commences and on an increasing scale up to a maximum of 6 lb per

day by the time the gilts reach 180–190 lb. The test finishes at 200 lb and at this point the gilts are ultrasonically measured for shoulder and loin back fat and readings taken at C. and K. (probe). From the records kept, the daily liveweight gain and food conversion rate are calculated and used as a basis for selection coupled once more with visual assessment. The selected gilts go on to the Nucleus and Multiplication herds whilst the rejects are slaughtered and their grading details used as a further aid to selection. The approved gilts are finally hardened off in conditioning yards which are deep strawed. At about 240 lb they are put in-pig and thence in to the breeding pipeline.

## Aid to the industry

Testing is a continuous process and standards are reviewed as improvements are made. The time is fast approaching when superior stock will convert at 2:1 in well managed commercial herds producing bacon pigs. An attractive long-term contract and the increase in demand for British bacon and fresh pig meat must mean that the industry is faced with a bright future, knowing that many technical problems have been overcome and that proven, tested breeding stock is available to the commercial pig producer in increasing numbers.

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The author of this article is **R. P. Charlesworth** of the Marketing Development Department of the National Farmers Union.

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## PERFORMANCE TRIAL REPORTS

The Ministry has recently issued the following new performance trial report leaflets relating to cereals:

No. 37 Winter Wheat, Maris Beacon
No. 38 Winter Wheat, Maris Settler
No. 39 Winter Wheat, Maris Teal
No. 40 Winter Wheat, Tommy
No. 41 Winter Wheat, Zorba
No. 42 Spring Wheat, Pompe
No. 43 Spring Barley Varieties
No. 44 Spring Oat Varieties
No. 45 Spring Wheat Varieties
No. 46 Winter Barley, Mirra
No. 47 Winter Wheat Varieties

Single copies of any of these leaflets may be obtained free of charge from the Ministry of Agriculture, Fisheries and Food (Publications), Tolcarne Drive, Pinner, Middlesex, HA5 2DT.

**Overseas volunteers from Britain help in many underdeveloped corners of the world. This article concerns the development of**

# Agriculture in Honduras

**Gwyn Williams**

THE Republic of Honduras is one of those Central American countries often described as a 'banana republic' due to its having been dominated since the early twentieth century by the American fruit companies. The population is a little less than three million and increases annually by almost three per cent despite a probable mortality rate of twenty per cent caused by malnutrition, disease and other causes. The average life expectancy is less than fifty years; the average daily intake of protein per head is fifteen units, as opposed to over thirty in Britain.

A feudal system prevails; most of the land, wealth and power is in the hands of about ten per cent of the population, whose standard of living is materially superior to that of their North American or European counterparts. The remaining ninety per cent has until recently been subject to a life of extreme poverty and deprivation and sixty per cent of the population over ten years of age is illiterate. As a result, development not only presents material and economic difficulties, but also sociological problems in that the peasants' fatalistic and apathetic attitudes have also to be overcome.

## Terrain and produce

The larger part of Honduras is mountainous with a few large fertile valleys. The only areas which might be described as low-land are situated on the northern Caribbean and southern Pacific coasts.

The humid north coast with its deep rich soils is extremely fertile and is dominated by the American fruit companies who are mainly concerned with bananas, although they have recently produced maize and horticultural crops and have cattle interests also. The large haciendas are mainly devoted to cattle and, to a lesser extent, maize and citrus fruits. The area is sufficiently fertile that two crops of maize, rice or water-melon and other horticultural crops can be grown without modern technology. The presence of the fruit companies has virtually destroyed traditional agricultural practice; the 'buey' or oxen has vanished from the zone so that the camposino, the peasant farmer, unable to purchase or hire modern machinery, has dispensed altogether with cultivation before planting.

The Pacific coast is extremely arid, the soil being of generally low fertility over a volcanic sub strata. The principal crop is cotton, the almost exclusive perogative of the large haciendas. Cotton production is almost entirely

mechanized, only picking being done by hand. This is the work of a seasonably employed labour force of camposinos, who, of necessity, dwell in miserable conditions on the edges of the cotton fields where they and the cotton are sprayed annually from the air during fumigation. Maize, beans and 'ajon joli' are cultivated and a horticultural crop is taken off during the winter months at the end of the rain season. January to April are extremely dry months during which a strong, hot wind blows consistently so that any cultivations during this period could result in serious erosion. The ox is still a familiar sight in the area and traditional tools of cultivation such as wooden ploughs, etc. are commonly employed. There are no extensive foreign interests in this zone.

## Land reform

Mainly due to growing internal, social and political pressure, an effort has been made to deal with the plight of the camposino. The basis of this effort has been the Agrarian Reform Act, which is designed to make available to the camposino land acquired by dispossession or compulsory purchase.

Although introduced in 1962, the Agrarian Reform Law was not seriously implemented until early 1969. The Act stipulated that only Honduran national could occupy national land so that 150–200,000 undocumented Salvadoranian camposinos, who had left their over-crowded homeland to squat in Honduras, were evicted, not only from their holding, but also from the country. As a result, friction developed between the two countries, which led to war, the disruption of the Central American Common Market and the loss to Honduras of its principal customer. This was a serious setback and continues to hamper economic development.

## The farmer and his farming

The Honduran camposino is usually of Spanish-Indian lineage and small of stature. For hundreds of years he has lived an unchanging life, lacking not only food and education but also, as a result of unfulfilled promises, hope. His home is usually of wood, mud, cane or bamboo, his family invariably large and his plot of land, if he is fortunate enough to occupy any, small and generally situated on the side of a mountain. (I once met a camposino who had broken his arm when he fell out of his field of maize). His method of land preparation before planting maize or beans is to fire the vegetation—a practice which not only lowers fertility and damages soil structure, but also does considerable damage to forestry which is the nation's second main resource. Final clearing is then carried out with the machette, a three-feet long knife which is the universal tool for all purposes, including resolving differences with neighbours. Planting is then simply a matter of making a hole in the ground with a long wooden pole and dropping in the seed. Weeding, if practised, is done with a matchette, as is harvesting. The camposino, never having been the occupier of a large extent of land, is not acquainted with crop rotation, fertilization or disease and pest control by modern methods. An appropriate technology must be found therefore which will, in a relatively much shorter period of time, bring him through what has taken two hundred years of gradual development in the advanced countries. This, with the agrarian reform as its base, is what is being attempted in Honduras and in most other struggling nations of the world.

## Internal co-operation

The camposino, being unable to offer security, is unable to obtain a bank loan as an individual and so they are encouraged to form themselves into co-operative groups. This system also has the advantage of making them available in groups for educational purposes and also encourages community co-operation and social responsibility. As a co-operative group, the camposino obtains legal recognition, credit and land up to 23·8 acres per family. But the agrarian reform programme is still young and most of the ground is yet to be covered.

## Outside help

During my two-year period in Honduras as a volunteer, I worked as mechanization adviser to an agency which provided technical assistance and machinery services to co-operatives. We employed a labour intensive philosophy, offering low cost machinery services only for that work which was beyond the capability of hand labour or simple animal drawn equipment. We also gave courses in operation and maintenance of agricultural machinery to those co-operatives which had purchased or were nearing the stage of owning their own machinery, advising them also on the size and type of machinery required for their particular needs.

Before going to Honduras I had worked for eleven years with the Ministry of Agriculture and can say without reservation that the two years spent in Central America have been the most rewarding of my life. The most able volunteers can never contribute to the host country as much as they derive from the experience. The need for agricultural volunteers in Latin America and elsewhere in the world is constant. To anyone who is qualified in the field and seeks a stimulating and wonderfully satisfying experience, I would say 'GO'. I propose to go back at the earliest opportunity and will be forever grateful to the volunteer agency which gave me the opportunity in the first instance.

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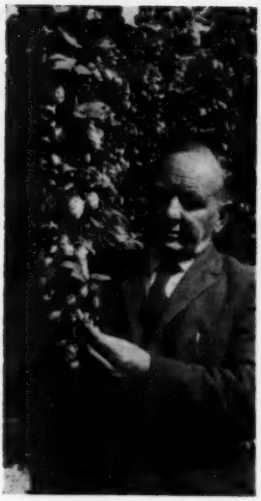
This article has been contributed by **Gwyn Williams** of the N.A.A.S. who spent two years in Honduras as an agriculturist of the Overseas Volunteers Organisation of the Catholic Institute for International Relations, 38 King Street, London, W.C.2. Previous to taking up this work he was employed by the Ministry of Agriculture, Fisheries and Food after leaving Monmouth Agriculture College.

**Appointment of new Director of Royal Botanic Gardens, Kew**

The Minister of Agriculture, Fisheries and Food has appointed Professor John Heslop-Harrison, M.Sc., Ph.D., D.Sc., F.R.S., F.R.S.E., M.R.I.A., F.L.S., F.I.Biol. to succeed Sir George Taylor, D.Sc., F.R.S., F.R.S.E., F.L.S., V.M.H., as Director of the Royal Botanic Gardens, Kew. Professor Heslop-Harrison will take up his appointment on 1st June, 1971.

Sir George Taylor, who was appointed in 1956, will retire on 31st May, 1971.



# Hop Growing in the Seventies

**G. P. Chater,**
*Director, Rosemaund Experimental Husbandry Farm*

THE art of brewing beer that has the same flavour and bitterness which customers recognize and expect whenever they consume their favourite beverage has been learned by long experience which is now traditional practice, together with the supply of raw materials of the right quality. The degree of bitterness and the distinctive flavour is imparted to the beer by the hop. Since the quality of the hops can vary depending on how they are grown, picked, dried and packed, with each operation having a considerable effect on the final product, the blending of various consignments by the brewer is a highly skilled operation. Although the brewer now places increasing reliance on the chemical analysis of the hop resins as a guide to the quality of hops, the traditional system based on long experience of quality assessment by colour, feel and smell still plays an important part in the purchase of hops.

The Hops Marketing Board, through a system of basic and annual quota, has been successful in the past forty years in maintaining the supply of hops required by the brewers at a reasonable cost, whilst giving an adequate economic return to the growers. In the last decade the acreage has been reduced from 21,000 acres to 17,000 acres and the number of growers from 900 to 540 without detriment to the industry as a whole.

## Experiments in hop growing

The hop is a perennial plant that is established with its own permanent wirework and remains on the same land for a long period of years. Many hopyards have grown hops continuously for the last 100 years although they have been replanted as improved varieties have become available. During the season growth is very rapid and by August bines reach a length of 20–25 feet with fruiting laterals along most of their length. If, in June, the weather is warm enough the bine will grow as much as 9 in. in 24 hours but, conversely, if the weather is cold growth almost ceases. It is not surprising, therefore, that notwithstanding the use of modern growing techniques the weather has the greatest effect on yield and quality.

Hop husbandry experiments at Rosemaund Experimental Husbandry Farm commenced in 1950 when the traditional methods of growing involved the employment of large numbers of semi-skilled casual workers. The selection, in the spring, of particular bines for training up each string, the stripping of leaves from the lower part of the bine later, and the hand-picking harvest employed thousands of people, most of whom regarded this operation as a holiday with pay.

As hops are such a long lived and high value per acre crop, and as quality ranks equal with yield per acre, experiments have to be conducted over a relatively long period so that results can be accurately assessed.

The first experiment at Rosemaund in 1952 was designed to test the value of continuous spring and summer deep cultivations on the crop. It was completed in 1960 and the results showed that one deep cultivation followed by shallow cultivations was as good as the traditional and more expensive deep cultivations continued to the end of July. In another concurrent experiment the results showed that the traditional careful selection of the right bines in the spring was unnecessary, especially on the Fuggle variety which constitutes about 65 per cent of the total national acreage.

## Mechanical picking

The increasing affluence of the industrial population had by 1950 resulted in a serious decline in the numbers available to harvest the crop by hand in the four weeks available and the consequent rapid development of mechanical picking. In 1950 about a dozen machines were in use and there was considerable apprehension on the part of the brewers and growers concerning the possible effect machine picking would have, not only on the quality of the final yield product for brewing, but also on the growth and subsequent yield of the plant that was cut off for transportation to the machine, usually situated near the kiln. Experiments at Rosemaund and improved designs to the picking machine have shown that mechanized picking need not result in such detrimental effects and today almost 100 per cent of the total national acreage is picked by machine. However, the need to carry the whole crop to the machine, inevitably at times when the soil is wet, increased the difficulties of subsequent cultivations, and notwithstanding the applications of large dressings of farmyard manure and other organic materials, the maintenance of good soil structure was difficult.

## Cultivation

An experiment was, therefore, laid down in which hops grown in a grass sward without cultivations were compared with those cultivated in the normal manner. The grass (S.50 Timothy) was gang mown about once a week during the whole growing season.In the early years of the experiment when the N was applied in the spring and summer, the yield of hops from the grass plots was only 50 per cent of those from tillage. However, when it was applied in December ($\frac{1}{3}$) and in January ($\frac{2}{3}$) the yields were dramatically increased and at the highest level of N (400 units) equalled those from the tillage plots (200 units N) and were of slightly better quality.

The saving in cultivation costs plus the advantage of easy spraying and picking was offset by the additional costs of nitrogen and gang mowing. In the earlier years of the experiment the unmown grass in the hop row

presented a problem in so far as it competed with the early growth of the bine; if left uncut it became a nuisance to the mower. However, with the introduction of paraquat a 2 ft wide band of this herbicide was sprayed over the hop stocks which eliminated the grass competition without damaging the hop plant. The application of simizane at the same time ensured clean rows throughout the season and resulted in an additional yield increase of 1 cwt per acre. Results of these no cultivation and herbicide weed control experiments suggested that it would be feasible to grow hops without any cultivation of the soil.

In 1965, therefore, an experiment was laid down in which plots without any cultivation but with paraquat and simazine applied as an overall spray in January/February were compared with normal tillage plots. The results showed that on the no cultivation plots yields from Fuggles, of equal quality, have been slightly higher than those from the normal tillage plots. These techniques of no cultivation and herbicide weed control not only reduce the cost and physical effort required but also, of paramount importance, reduce the damage to soil structure. In south-east England where Progressive Verticillium Wilt has caused considerable damage and financial loss in the last thirty years, growers have been able to reduce the spread of, and losses caused by, the disease with these techniques.

Experiments have also been carried out at Rosemaund to determine the value of reducing the amount of labour to hand train the bines during the spring period. It was found that when the bines were semi self-trained and the surplus growth was removed with a chemical stripper (e.g., tar oil) instead of by hand, the yields with Fuggle were equal to those following normal hand training. This system, however, requires that the chemical must be applied at the right time otherwise too much bine is produced which is detrimental to efficient picking by the machine. The success of this method has yet to be proved with other more vigorous varieties.

*Fuggle hops on square (Kent) work*

## Pests and diseases

Spraying for pest and disease control is carried out very frequently throughout the whole season since failure to do so can result in reduced yields, poor quality and consequently a crop with a reduced value. The Hop

Damson Aphis is an annual pest that can do a considerable amount of damage, particularly late in the season when the hop begins to develop. The organophosphorous insecticides have controlled this pest for almost twenty years but, unfortunately, in recent years the pest appears to have become resistant to these materials and there have been cases of considerable damage to the crop. Very active steps are being taken to find new chemicals that will give the required control. Although much research work on virus diseases in the hop has been carried out for many years, mainly at East Malling Research Station, their elucidation is as yet far from complete. Recent work at Rosemaund has confirmed the transmission of Arabis Mosaic virus by a soil eelworm (*Xiphinema Diversicaudatum*) and experiments to determine possible control measures have been laid down. The problem of Nettlehead known for at least a century and caused by viruses still awaits solution.

## Varieties with hop resin content

Intensive research into the brewing process and the amalgamation of the many brewers into a few large groups has resulted in a considerable improvement in the utilization of the hop resin although demand for hops is naturally less. With changing systems of brewing the brewer places increasing reliance on chemical analysis of the hop and consequently there is an increased demand for varieties with a high resin content although demand for other hops is naturally less. To meet these changes in demand the acreage of varieties bred at Wye College is now increasing. Furthermore, new high resin varieties that have even a higher resin content and yield per acre potential, coupled with resistance to downy and powdery mildew are under trial on a field scale at Rosemaund and elsewhere.

The orderly contraction of the hop growing industry has been accomplished through close co-operation between the Hops Marketing Board and the Brewing Industry with the result that hops are produced as cheaply in this country as anywhere in the world.

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### Royal Show Going International?

2,793 overseas visitors from 93 different countries attended this year's Royal Show. This was an all-time record. Immediately after the Show several foreign and Commonwealth countries approached the Society to obtain details of costs and facilities with a view to participation by next year, or by 1972 at the latest. This response coincided with a decision within the Society to seek International Exhibitors.

The Society is confident that within five years the Royal Show will become one of Europe's busiest agricultural business centres.

*For over thirty years the universities have been co-operating with each other, and with the Ministry, to carry out the annual survey that is useful for the purposes of day-to-day farm management decision making and advisory work. The author discusses the usefulness of the*

# Farm Management Survey

**Professor D. K. Britton**

ONE of the most useful sources of information about British agriculture is the White Paper which is published each year after the Farm Price Review. Entitled *Annual Review and Determination of Guarantees*,* this contains, in its appendices, much of the statistical material which provides the basis for discussion between the Government and the farmers.

Part of this material (Appendix IV) consists of figures of average net incomes earned by farmers in different regions of the country on various sizes and types of farms for England, Wales, Scotland and Northern Ireland. The figures for England and Wales are derived from the *Farm Management Survey*, an annual inquiry undertaken by ten universities which between them cover all parts of the country.† From time to time each of these universities publishes reports on the detailed results of the Survey; and the Ministry of Agriculture, Fisheries and Food publishes simultaneously with the announcement of the Annual Review determinations, an annual report on 'Farm Incomes in England and Wales' which presents statistical tables summarizing the information in the latest two years throughout the country. The results are classified by type of farming and size of business based on standard man days.

For over thirty years the universities have been co-operating with each other and with the Ministry to carry out this annual survey. By using agreed definitions and methods, they have built up an unbroken series of descriptive statistics which trace the development of British agriculture in its economic and financial aspects, and which would not be available in comparable detail from any other source.

## Purposes

One of the main purposes of the Survey is to provide for the Government, for farmers and for the public at large an indication of the year-to-year changes in the economic conditions of farming, so that debates and decisions on agricultural policy may take place in the full knowledge of these

*Latest publication: *Annual Review and Determination of Guarantees 1970*. Cmnd. 4321. H.M.S.O. 5*s*. [25 p].

†The Universities of Bristol, Cambridge, Exeter, Leeds, London, Manchester, Newcastle, Nottingham, Reading and Wales (Aberystwyth).

facts. The Survey also shows how the level of farm output and net income varies between farms in response to variations in size of farm, in climatic influences, in prices and in efficiency. Thus it is possible to form an impression of 'where the shoe pinches' and where adjustments have been made or need to be made.

The information collected in the *Farm Management Survey* is also useful for day-to-day farm management decision-making and advisory work. The published results are inevitably 'historical' in some measure, as they do not relate to the current situation on any farm and are generally between one and two years out of date; but they help to provide production standards, efficiency standards and income standards for groups of farms which may then be used for comparison with the analysed accounts of individual farms. Thus the Survey has provided material for farm management handbooks which are very widely used.

The information is likewise of value for teaching and research purposes. Many points about the economics of agriculture can be effectively demonstrated with the help of Farm Management Survey data, and many local, regional and national studies of farming conditions have drawn heavily upon this source. Indeed, there are indications that in future this may extend to international studies, where comparisons of technical and economic efficiency are of vital interest in that they affect competition for markets and the living standards of those engaged in agricultural production.

## The Survey and the census

All farmers are familiar with the 'June Returns' which they are obliged to complete and send to the Ministry each year, and with various quarterly and other returns which come along from time to time. These are compulsory, and all occupiers of agricultural land with a significant amount of land and output are liable to be asked for information about their land and crops grown; the numbers of animals of various kinds; of the labour force (including from June 1970 farmers themselves); and of agricultural machines. No financial figures of any kind have to be given.

Because of this, the agricultural census does not in itself provide any indication about farm receipts, expenses or net incomes (i.e., the difference between receipts and expenses, after allowing for changes in stocks between the beginning and end of the year). It is true that the Ministry can make an estimate of the *total* receipts, expenses and net income of British agriculture as a whole without asking each farmer, or even a cross-section of farmers, for their individual figures under these headings. This estimation is done by the 'global' method, drawing upon such information as total Milk Marketing Board payments to farmers, total deliveries to sugar beet factories, total sales of wheat as certified for purposes of subsidy payments, average levels of earnings per man and rent per acre, etc. However, it is very important to be able to check such estimates against an independent source of data such as can be forthcoming only by referring to individual farm accounts.

The Farm Management Survey takes its place as a complement to the Agricultural Census: but it stands in contrast to it in being neither universal nor compulsory. It is a *voluntary* survey collected on a *sample* basis. At the present time it embraces only about 2,500 farms, or less than two per cent of the total number of farms in England and Wales.

The reasons for making the Survey on the basis of a voluntary sample are not far to seek, though they are partly historical. The census form is a fairly straightforward (if irksome) document, and experience has shown that it can generally be completed and returned by the farmer without any expert assistance. On the other hand, to collect full information about a farmer's receipts and expenses, as well as about the quantities produced and the resources used, is a long and painstaking process which involves at least one visit to the farm by a person trained in farm accounts and in survey methods. This means that a survey of farm incomes is expensive.

It also calls for considerable time and trouble on the part of the farmer and requires him to part with information about his financial position which he will usually regard, with good reason, as being highly confidential and which he cannot be obliged to report under any existing Act of Parliament. Whoever seeks data of the kind collected in the Farm Management Survey must, therefore, secure the willing co-operation of the farmers and ensure that the results are not passed on to neighbouring or rival farmers, tax inspectors or other government officials in any way which would make it possible for the co-operating farmers to be identified.

It has already been mentioned that the results of the Farm Management Survey are used by the Ministry (and by others) at the annual Price Review; but the identity of the farmers contributing to the Survey is never revealed to the Ministry. They know the constituent farms only by code number, and the key to these code numbers is retained by the universities responsible for the survey.

Because the data are used in the Price Review 'it was felt desirable that the selection of farms and collection of information should be in "neutral" hands: again it was thought that some farmers would be more willing to make their accounts available to a university investigator than to the Ministry'.* The universities built up their local samples in their own way, attempting to achieve an adequate cross-section within the limits imposed by their resources of money and of staff (paid by direct grant from the Ministry) and by the need to rely on voluntary co-operation from the farmers. Many farmers have stayed in the Survey for a number of years, but usually about 10 per cent each year drop out for one reason or another and need to be replaced. When making these replacements the universities try to maintain a good balance by size and type of farm, and they usually do so by approaching farmers in their area whose names have been drawn in a random sample analysed by size and type from the Agricultural Census register kept by the Ministry.

## The Survey sample

It can be confirmed, by comparison with census information, that the present sample of about 2,500 farms (some of which are not included in the annual 'Farm Incomes' report because of delay in obtaining the data) is reasonably representative of the whole, at least in important respects. For example, the 1968 'Farm Incomes' report† showed that in England and Wales as a whole 22 per cent of the farms were of the 'Specialist dairying' type; in the Survey sample, 21 per cent. Farms described as 'Livestock, mostly sheep' were 3 per cent in the census, 4 per cent in the Survey. The balance is not as

*Winnifrith, Sir John. *The Ministry of Agriculture, Fisheries and Food.* (1962) p. 217.
†*Farm Incomes in England and Wales*, 1968. H.M.S.O. 16*s.* 6*d.* [82½ p].

good as this in respect of all types of farming—there is, for instance, an inadequate representation of pig farms and poultry farms—but on the other hand it can be argued that so long as the 'universe' (England and Wales) proportions are known, any bias in the sample can be ascertained and allowed for.

The survey sample contains proportionately more large farms and fewer small farms than are known to exist in the 'universe', but correction can be made for this by the use of weighting procedures.

It is much more difficult to judge whether the Survey is fairly representative or is biased in respect of the general standard of management (and hence the income) of the farmers concerned. The universities endeavour to include in the sample all qualities of management—good, bad and indifferent—but they cannot be sure that they have succeeded in this. It could be argued that farmers who are willing to provide the information are, for that very reason, an unrepresentative cross-section; they might be expected to be more progressive, more open-minded, more aware of the importance of record-keeping and business analysis, than the average. On the other hand, some of them might be co-operating because they believe that by taking part in the Survey they may be enabled to tackle weaknesses which are hindering their economic progress.

On the basis of such limited checks as are possible, there seems no reason to conclude that the Farm Management Survey figures, after allowing for the composition of the sample by type of farming and size of farm, are significantly biased in either direction. However, because it is not possible to be certain on this score it is advisable not to attach too much importance to the absolute level of receipts, expenses and net income shown for each group as analysed in the Survey, but rather to concentrate attention mainly on the differences between groups and between years.

It must also be kept in mind that many of the figures published are averages which hide wide ranges in actual performance. This is clearly demonstrated in the tables in *Farm Incomes in England and Wales* on the distribution of net incomes and on the comparison of High and Low performance farms.

## Single enterprises

Finally, it should be remembered that the main purpose of the Farm Management Survey has been to reveal the financial situation of each of the farms as a whole, rather than to attempt to assess the relative profitability of the separate enterprises—milk, eggs, potatoes, etc. It is only in the last few years that the Ministry and the universities have begun to explore the possibilities of using or adapting the Survey data to gain information about enterprises. Some progress has been made in obtaining records (or estimates) from farmers which permit certain variable costs—concentrates, fertilizers, seed, sprays and veterinary expenses—to be allocated between the enterprises. This enables an approximate indication to be gained of the respective gross margins earned by each.

In future, further modifications of the Survey are likely. Even if the size and composition of the sample are considered to be adequate for most purposes, it may be expected that more attention will be given to the capital situation, as distinct from the income situation, of the farm.

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This article has been contributed by **Professor D. K. Britton, M.A., B.Sc., (Econ.)**, of the Department of Agricultural Economics, University of Nottingham.

# Stomach Worms in Calves

J. F. Michel

PARASITIC roundworms inhabiting the stomach of young cattle are the cause of very considerable loss, chiefly by retarding growth. It is a loss which can be avoided now that the complex connection between grazing management and parasitic disease is better understood. The control measures that were formerly advocated and the theories on which they were based have been superseded. The aims and methods of control have changed. This is best explained by contrasting present views with those held until recently.

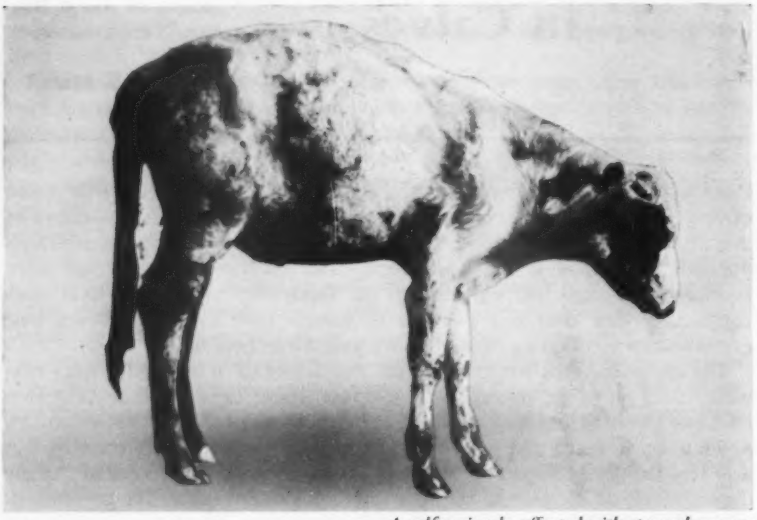
The life cycle of the worms is simple. Adult worms in the stomach lay eggs which pass on to the pasture in the dung. These eggs must develop into infective larvae before they are capable, when swallowed by a calf, of settling down in its stomach and growing to maturity. It was formerly thought that this free-living development from egg to infective larva proceeded rapidly during much of the year so that the interval between successive generations was little more than four weeks. Several generations could, therefore, occur during the grazing season. It was thought that as the number of worms in the calf increased, so did the number of worm eggs in its dung. The more heavily the calf became infected, the greater was the rate at which it picked up yet more worms. So worms accumulated through the season as newly acquired worms were added to those already present. Exponential population growth was thought to continue until the calf died or until it became immune. On the basis of these views attempts to control worm infection were aimed at slowing down population increase. A number of measures having this general effect was proposed and it mattered little when they were applied.

## Worm burdens and egg output

This system of ideas has been replaced by another. It is now recognized that worm burdens do not increase by the addition of new worms to old. Adult worms are constantly being lost at a rate depending on their number and the size of the burden is regulated by a balance between gain and loss. It follows that a calf picking up infective larvae in small numbers will harbour few worms no matter how long it continues to do so. Large and harmful worm burdens occur only when larvae are picked up at a great rate, that is, when their concentration on the herbage is heavy. It also follows that if animals remain exposed to infection the effect of anthelmintic treatment will be temporary, for all the worms removed will be very quickly replaced.

The output of worm eggs in the dung is regulated by an interesting mechanism. This limits the total of eggs produced by all the worms in the calf. The output of eggs tends to be the same whether few or many worms are present and follows the same pattern, rising rapidly to a peak from which it gradually declines. Therefore populations of worms cannot increase as was formerly visualized for this demanded that egg output should reflect worm numbers. It follows also that from year to year the egg output

of calves turned out in the spring is likely to vary less than the herbage infestation to which they were exposed.



*A calf seriously affected with stomach worms*

## Larvae on herbage

Before worm eggs passed in the dung can infect a calf they must develop to larvae and these must migrate on to the herbage. The first step demands some warmth while the second is favoured by wet conditions. The whole process can occur during only a relatively short season and for much of this it takes considerably longer than the minimum period. The migration of larvae is often greatly delayed with the result that the dung may act as a reservoir of infection from which larvae may be released over a very long period. Worm eggs that reach the pasture in the spring take much longer to become infective larvae on the herbage than do those dropped in summer. In consequence, eggs passed up to the end of June tend to appear as larvae on the herbage during a short period in July so that the infestation on the herbage increases steeply at that time. The suddenness of this increase is further accentuated by the fact that the proportion of the eggs that successfully develop to the infective stage increases during spring and early summer. Thereafter it decreases gradually and eggs passed after the middle of the grazing season make an even smaller contribution to the infestation of larvae on the herbage. Only a negligible number of eggs passed after September ever complete their development.

Having increased sharply in July, the infestation on a pasture contaminated during the first half of the grazing season tends to remain at a high level during autumn and winter. This is because the infective larvae are long lived and because those that are removed by grazing or lost in other ways are replaced by the gradual release of larvae from the dung. When the dung finally disintegrates in the winter, a further increase in the number of larvae on the herbage is frequently observed. The exact course of the infestation on the herbage from July until the end of winter is influenced by the weather. If the summer is dry only a small increase occurs in July and large numbers of

larvae unable to migrate from the dung accumulate. A very great increase in the number on the herbage occurs when wet weather returns in the autumn and levels remain high during the winter. If the summer is very wet, heavy infestations on the herbage occur in July and August but they will tend to be rather low in late autumn and winter. During March and April, infestations always decrease to low levels as the larvae are greatly diluted by the growth of grass and because many have exhausted their food reserves and die.

## How disease occurs

If the calves are turned out in late April or May on pasture that was grazed by cattle in the previous year, they will pick up small numbers of larvae and will acquire small worm burdens. They will, however, pass appreciable numbers of worm eggs in their dung. Although the contamination of the pasture with these eggs will begin in late May, the larvae will not appear on the herbage until July. If climatic conditions are suitable and this new generation of larvae is numerous, it will be the cause of disease in calves remaining on the pasture. Soon after the beginning of August their rate of liveweight gain will fall sharply and the familiar symptoms of stomach worm infection, scouring, loss of appetite, rough coat, sunken eyes and so on, will become evident a little later.

A second generation of worms may occur but it is not numerous and is relatively unimportant. The worms may almost be regarded as annuals completing only one generation per year. Not only is each year's new generation the cause of disease, but some of the larvae persist on the pasture until the spring to infect the following year's calves.

## Control

If harmful stomach worm infections are to be avoided, calves must not be allowed to graze on heavily infested pasture. As has been shown above, infestations on the herbage are likely to be at a harmlessly low level from the end of April until July and, if the pasture has been contaminated during this period, heavy infestations are liable to be present from July onwards. These features have been found to be sufficiently constant to form the basis of control measures. No action need be taken until July, but the calves must then be removed from pastures which they have grazed (and contaminated) up to that time and transferred to clean pasture. In practice, aftermaths will be used and, for a number of reasons, the 15th July is the date recommended for the move. Since the calves will still be passing appreciable numbers of worm eggs in their dung at this time, and conditions in July are still favourable for their development, the aftermaths may become dangerous to the calves after a time. There are two ways of dealing with this difficulty. The first is to prevent or at least to postpone the contamination of the aftermath by giving the calves effective anthelmintic treatment on the day they are moved. A large dose, within the limits of safety, of one of the modern anthelmintic drugs should be used, or alternatively, treatment should be repeated after one week. The second way is to move the calves again in the middle of August. On this occasion land previously grazed only by adult cattle would be suitable. Adult cattle pass only very small numbers of worm eggs. They are also resistant to infection and can safely graze those pastures from which calves have been removed.

Where cattle under eighteen months of age are the only stock kept, these methods of control may raise practical difficulties. Other methods are, however, available. If calves reared in reasonably clean conditions graze pastures which have not carried cattle for a year, a harmful infestation will not be built up within one season. Thus, on arable farms where leys serving as a break crop are used for raising hand-reared calves, no danger from stomach worm infestation need be apprehended. Similarly, where, for the control of *Nematodirus* infection in lambs, sheep and cattle graze different parts of the farm in alternate years, the calves will not acquire harmful numbers of stomach worms.

Another example of a system of management that very greatly reduces the hazard involves the use of three year leys. Here the calves will first graze the new pasture while the second and third year grass is conserved. The new, and therefore sterile, grass grazed by clean calves will remain clean, while the infestation on the second and third year grass falls to a very low level. After midsummer all the pastures will be grazed. Of course, the newly established grass should not be grazed in the stubble, at any rate not until October.

## Other hazards

Mention must be made of some further hazards. Larvae picked up from the pasture in autumn and winter do not develop in the calf in the normal way, nor is their number regulated in the same manner as that of adult worms. The development of many of these larvae is arrested at an early stage of development and very large numbers of immature worms may accumulate over a period of time. While normally these immature worms resume their development in small numbers, they may all do so at the same time to cause very severe disease in late winter or spring. The danger is particularly great after a dry summer when heavy infestations of larvae are liable to be present on the herbage. Clearly, if young cattle are to remain on the pastures in late autumn, or if they are to be outwintered, the choice of safe grazing demands care. Certainly, it should not have carried young cattle before the middle or end of August.

Attention should also be directed to the danger of turning calves out exceptionally early in the spring when larvae may still be numerous on the herbage. If calves are to be turned out before the third week in April, or before appreciable grass growth has occurred, a pasture that was not grazed by calves in the previous year should be used. There are reasons for believing that, if a late spring follows after a dry summer, there is a chance that meaningful numbers of larvae may remain on some pastures until early May. In these circumstances, pastures grazed by calves in the previous year should be avoided, or turning out should be delayed.

## Conclusion

Stomach worm infection is controlled by withholding calves from heavily infested grazing. This may be achieved by a number of systems of management. Some examples are described above but, with the aid of the facts given in this article, other systems may be devised to suit particular requirements.

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This article has been contributed by **J. F. Michel, M.A., Ph.D., Dip. Agric. Sci. (Cantab.)**, of the Central Veterinary Laboratory, Weybridge, Surrey.

# Soil Sterilization under Glass

Marion H. Ebben

CROP rotation in agriculture evolved as a method of escaping the worst effects of soil-borne and other pests, diseases and weeds, but when a soil is monocropped some form of soil sterilization to control soil-borne pathogens can be advantageous after three to four years. The large capital outlay and the labour and heating costs involved in the intensive cropping in a commercial glasshouse make continuing high yields essential, and the relatively high costs of soil sterilization have long been accepted as economically necessary. The smaller areas involved and the greater degree of environmental control make the more uniform conditions necessary for efficient use of sterilants easier to maintain under glass than outdoors.

## Biology of sterilization

In Britain soil sterilization is used mainly to control specific diseases caused by soil fungi and nematodes. Soil-borne bacterial pathogens are rare in this country, and soil insects, although present in maiden loam, are a minor problem once a soil has been sterilized, except occasionally in propagating soils. Weed seeds are also destroyed and this results in easier crop management. Usually, fungal pathogens such as *Pythium*, *Phytophthora* and *Rhizoctonia*, which can live in the upper soil layers and attack their host at or near the soil surface, are more easily controlled by sterilization than fungi and nematodes which survive in root debris or as sclerotia or cysts in the soil. Examples of the latter include the tomato brown root rot pathogen, *Verticillium* wilt of tomato and chrysanthemum, and the potato cyst eelworm which attacks tomatoes. Pathogens which spread through the entire root system may be found in root debris at all soil levels to which crop roots have penetrated, and in crops such as tomatoes, cucumbers, carnations and roses this is well below the level at which any currently available sterilization treatment is effective. For this reason wilt fungi, and nematodes forming cysts and galls, can eventually be found reinvading a sterilized soil once the roots of the crop have reached the deeper soil layers.

Even under ideal conditions no soil sterilant is completely effective, and the disease potential of a sterilized soil thus depends on the original population levels of the pathogen and the efficiency of the treatment. The great decrease in the numbers of soil micro-organisms after sterilization sometimes allows a surviving or reinvading pathogen to spread more rapidly than through untreated soil where microbial competition is greater, e.g., *Phytophthora* and *Pythium* causing damping off of seedlings and *Didymella lycopersici* causing canker of tomato. Observations such as these prompted research into the use of steam-air mixtures as a soil sterilant.

Some break-down of nitrogenous matter occurs when most sterilants are applied, and since the beneficial nitrifying bacteria are largely destroyed phytotoxic levels of ammonium and nitrite compounds can accumulate before the nitrifying bacteria reinfect and increase to normal levels. The use of fertilizers which could aggravate these effects has, therefore, to be regulated for several weeks after soils have been sterilized.

## Methods of sterilization

There are two types of soil sterilization, by chemicals or heat. Chemical sterilants can be subdivided into

*fumigants*, which are applied or injected as liquids, vaporize in the soil and diffuse as gases;

*water-miscible compounds*, which are watered on to the soil; and

*dusts and granules*, which are mixed into the soil mechanically.

Compounds in the last two groups may act directly or break down in the soil to give active compounds. The ideal sterilant should be non-hazardous to humans in the form used in the glasshouse, able to penetrate or be distributed evenly through the soil, and should not leave phytotoxic residues for long periods after treatment. No sterilant will work well on a poorly prepared site; earth clods and wet patches resist penetration and may leave a reservoir of viable pathogens in the soil, and cultivation to a depth of 12 in. and breakage of any panning below is necessary if sterilants are to penetrate.

*Steam plough and sheet covering treated soil. Previously treated strip on left*

## Sterilizing by heating

Steam at 100°C (212°F) has been used for fifty years and still comes closest to the ideal sterilant. Where steam heating is used, mains steam is available for soil sterilization, but the number of contractors who hire-out steam boilers has decreased greatly and many growers have no alternative but to use chemical sterilants.

The methods used to distribute the steam in the soil have changed as labour costs have risen. The use of grids and, particularly, Hoddesdon pipes which inject steam at depths of 8–12 in. into the soil is still the most efficient method, but is largely being replaced by sheet-steaming which requires less labour. By this method steam is injected under a p.v.c. sheet, the edges being well weighted down with loose soil or chains. The steam lifts the sheet before beginning to penetrate downwards, and soil air is pushed down and outwards to escape outside the sheet edges. Periods of application up to six hours may be needed to get adequate depth of steam penetration. Sheet-steaming is widely used on raised beds, e.g., in year-round chrysanthemum growing, since it can be done while crops are still growing in other parts of the house. Work at the National Institute of Agricultural Engineering has shown that steam consumption is higher with sheet-steaming than with Hoddesdon pipes, and soil temperatures more variable. Where concrete-based beds are treated, wet basal soil layers may be inadequately heated, and some pathogens may survive.

The soil temperatures obtained during sheet-steaming are, however, usually adequate to control most pathogens as the experimental work with steam-air mixtures has shown. At the Glasshouse Crops Research Institute the use of Hoddesdon pipes modified to introduce steam-air mixtures into soil at 88°C (190·4°F) was found to give results as good as with steam in controlling brown root rot of tomato. The Venturi system, by which air is sucked into a pipe behind a steam-injection nozzle, does not produce a mixture with sufficient pressure for sheet-steaming, but in the U.S.A. and Australia a more expensive fan air-injection method gives a mixture at pressure suitable for sheet-steaming or for treating large quantities of propagating soil.

Steaming can also be carried out by slowly winching through the soil steam-injection tines set at a depth of 8–10 in. When the plough has passed, the soil is covered with a plastic sheet for about one hour. This method could increase in popularity in wide-span houses.

## Chemicals as sterilants

All chemical soil sterilants at present used are potentially harmful, and recommended precautions should always be observed when they are handled. Methyl bromide, particularly dangerous since it has no warning smell, should only be used by contract servicing companies who should be responsible for its distribution and use.

Fumigants which disperse through the soil in gaseous form are chloropicrin and methyl bromide, general sterilants, and D-D (dichloropropane-dichloropropene), used mainly against nemotodes. Chloropicrin and D-D are injected into the soil at intervals as liquids, and the soil surface is then 'sealed' by covering it with polythene sheeting or by compacting and flooding the soil surface. Depending on soil temperature, it takes six to twelve weeks before phytotoxic residues have escaped and the soil is safe to plant.

The use of methyl bromide under glass has greatly increased in the last five years. Liquid methyl bromide (boiling point 4·6°C (40°F)) at atmospheric pressure is vapourized from cylinders or 1 lb canisters, and the gas is passed through tubing under a polythene sheet supported about eight inches off the ground with the edges anchored firmly in the soil. The gas spreads rapidly over the entire soil surface under the sheet and, being heavier than

air, sinks into the soil; the polythene sheeting is later removed, usually after four to five days. Depth of penetration is affected by soil type and condition, soil moisture, temperature, compaction and organic matter being important. Moist soil conditions are necessary for seven to ten days before treatment for the control of weed seeds and pathogens in debris. Concentrations of 1½–2 lb per 100 square feet are needed to control wilt and tomato corky-root pathogens which survive in root debris, but ½ lb per 100 square feet will usually control weeds and soil nematodes. The soil can be planted one week after treatment, except with carnations which are highly susceptible to bromide residues in the soil. The short period required between treatment and planting gives methyl bromide a great advantage over other chemical sterilants which leave persistent phytotoxic residues.

Chemicals which can be watered on to the soil include formaldehyde and metham-sodium; the latter can also be injected in a concentrated form and then mixed into the soil by cultivating. In trials at Stockbridge House E.H.S. the effectiveness of metham-sodium was increased when the same quantity was applied in increasing amounts of water, i.e., as distribution in the soil improved. Metham-sodium breaks down in the soil to release an active compound, methyl-isothiocyanate (MIT), which can itself be injected into soil alone or mixed with other chemicals; the active form is more hazardous to handle. Dazomet also breaks down to MIT in the soil, and as it is applied as a powder or granules it is much easier to use. It needs to be thoroughly incorporated into the soil for good results, and the soil surface must then be sealed. Treated soil is left for two to three weeks and then rotavated to help release all traces of chemical residues, which takes a further three to six weeks.

## Choice of method

When deciding whether to sterilize a soil, the grower has several interacting factors to consider. The occurrence of a specific disease problem in the previous crop may make sterilization essential. The cost of different sterilants and the time and labour available between the desired cropping sequence influence the type of sterilzation used. Steam sterilization using Hoddesdon pipes can cost up to £800 an acre, sheet-steaming £200–700, methyl bromide £500–700, and other chemical sterilants £200–500. The higher costs of steam or methyl bromide may be fully recouped by the shorter time interval necessary before replanting, giving an earlier and longer cropping period. Even where disease levels appear to be low or non-existent, it is difficult to be sure that build-up during the following crop will not affect yields, and for this reason annual sterilization will continue to be practised where high yielding crops are necessary.

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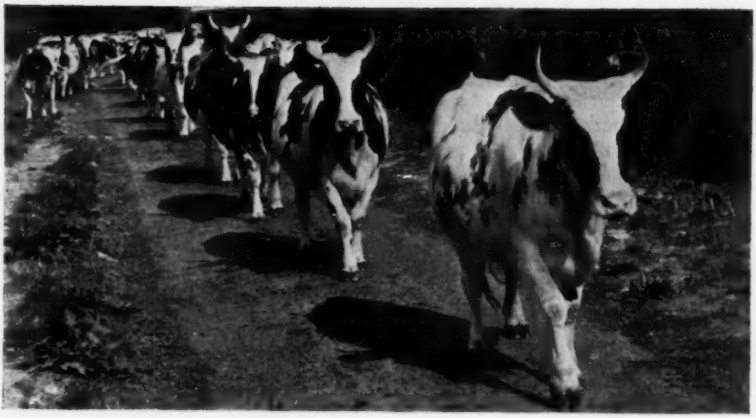
This article has been contributed by **Miss M. H. Ebben, M.A.**, who is with the Mycology and Bacteriology Department of the Glasshouse Crops Research Institute, Rustington, Sussex.



# 39. Somerset

**R. S. Hunter-Smith**

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*'The air is nowhere sharp as in many other counties but is everywhere so gentle and mild at all times that some have thought the county takes name from the summerliness of the air.'*

Camden: *Magna Britannia*

SOMERSET is one of the seven counties in England and Wales with an area of over one million acres. It stretches some eighty miles from Frome in the east to Exmoor in the west and some forty miles from the outskirts of Bristol in the north to Crewkerne on the Dorset border. The sixty miles of coastline along the southern shore of the Bristol Channel include such holiday resorts as Weston-super-Mare and Minehead. Exmoor, the Quantocks Hills and the Mendips, with their famous caves at Cheddar, attract many tourists to the county as do the cities of Bath and Wells and the town of Glastonbury, which is commonly believed to be the birthplace of Christianity in England.

The mild climate and relatively high rainfall which Somerset enjoys provide conditions that are ideal for the growth of grass. It is not surprising, therefore, to find that over 80 per cent of the farmland is in grass, much of it permanent pasture. Although beef and sheep contribute to the agricultural output, dairying is by far the most important enterprise, accounting for almost 50 per cent of the total output. Milk production is the cornerstone on which the farming economy of the whole county is based except for the

upland area of West Somerset and for well defined areas of good arable land where cereals, potatoes and market garden crops provide an alternative to milk. The amount of milk produced has risen steadily over the years and now exceeds 150 million gallons annually—more than any other county in the country.

## Cheese-making

Cheddar cheese used to be made on many farms. Today, however, the quantity of milk which can be processed on the farm is controlled by the Milk Marketing Board. There are now only thirty farmhouse cheese-makers who process 15 million gallons of milk each year from their own farms and those of their co-operators, mainly into Cheddar and Caerphilly cheese. Whey produced in the cheese-making process is a valuable by-product used for fattening pigs. The farmhouse cheese-makers form a group of the larger milk producers with an average herd size of nearly eighty cows, twice the county average. The farmhouse cheese industry is a unique example of successful co-operation; it is also a fascinating example of a remarkably self-sufficient system of farming with the cows producing the whey to feed the pigs and the pigs producing the muck to go back on the grass.

## Livestock and dairying

The upland area of the county is dominated by Exmoor, most of which is in Somerset and not, as generally believed, in Devon, and by the Brendon and Quantock Hills. Much of the farmland here is above the 1,000 ft contour and is devoted primarily to livestock rearing with Devon cattle, Exmoor Horn and Devon Closewool sheep the traditional breeds. On a few of the larger farms on the exposed hills Galloway cattle and Scotch Blackface and Cheviot ewes are found. Between the hills and the coast is a strip of land where arable farming is practised and where climatic conditions are such that top quality malting barley can be grown.

Between the Mendip and Quantock Hills there are some 150,000 acres of low lying pasture, through which the rivers Tone, Parrett, Brue, Axe and Yeo all flow. The area, which is divided by the Polden Hills and is less than 25 ft above the sea level, is devoted to summer milk production. Milking bails are taken on to the 'moors' in the spring from the farmsteads sited in the villages on the high ground. Those who farm here face special difficulties, not only because of the inherent drainage problems but also because of the small size of the farms and the fragmented nature of the holdings. The area has immense potential for intensive dairying once the drainage problems have been overcome, a task which the Somerset River Authority has well in hand. The 20,000 acres of peat could one day become an intensive arable area similar to, but much smaller than, the Lincolnshire fens and the Lancashire mosslands.

## Fruit growing

An intensive strawberry growing area has grown up on the southern slopes of the Mendips in the Cheddar Valley where climatic conditions favour the production of early strawberries for the dessert fruit market. To encourage early ripening a system of annual cropping has been developed; polythene cloches and tunnels are also used in May and June and these give a patchwork appearance to the countryside at that time of the year.

The cider orchards which used to be a feature of the Somerset scene are no longer so numerous. Farmhouse cider is much less common than it used to be and most of the cider apples now grown go to manufacturers bottling for the trade. There are signs of a revival of interest, however, and some new orchards have been planted. In addition to cider orchards there are several first-class orchards producing top quality Cox's Orange Pippins which have a reputation nationally for their fine colour and flavour.

### Willows

Willows were once an important crop on the Somerset lowlands. Today, however, high labour costs, synthetic materials and mass production methods have forced many growers out of business and the acreage of willows has fallen appreciably. Teasels are another crop associated with the moors. Again, new techniques, synthetic fibres and the importation of teasels from France and Spain have reduced the acreage to negligible proportions.

### The future

It is difficult to envisage any major changes in the pattern of farming in the county. Agricultural production will continue to rise as more and more farmers appreciate and harness the full potential of the grassland on which their livelihood depends. Somerset will surely remain one of the premier agricultural counties of the country.

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## The Ministry's Publications

Since the list published in the September 1970 issue of *Agriculture* (p. 442) the following publications have been issued.

MAJOR PUBLICATION

MECHANIZATION LEAFLET

No. 28. Orchard Sprayers (New) 1*s.* 9*d.* (by post 2*s.* 1*d.*)
(SBN 11 240685 8)

FREE ISSUES

ADVISORY LEAFLETS

No. 57. Wingless Weevils (Revised)
No. 365. Houseflies, Blowflies and Cluster Flies (Revised)
No. 532. Fruit Tree Tortrix Moths (Revised)
No. 542. Lime in Agriculture (Revised)

SHORT TERM LEAFLETS

No. 14. Chemical Weed Control in Bush and Cane Fruits (Revised)
No. 104. Windbreaks for Orchards (New)

UN-NUMBERED BOOKLET

Bee Health and Beekeeping in England and Wales, 1969 (Revised)

*Priced publications are obtainable from Government Bookshops (addresses on p. 494) or through any bookseller. Single copies of the free items are obtainable from the Ministry (Publications), Tolcarne Drive, Pinner, Middlesex. HA5 2DT.*

# Bulk Milk Vat Installations:

## Some Practical Points in Building Construction

**R. C. Barker**, *Agricultural Land Service, Kendal*

THE next few years are likely to see many more bulk milk vats installed on dairy farms up and down the country and those farmers who have not already 'gone bulk' would do well to consider now how best to adapt their systems when the time comes. Although there are many farms in the fortunate position of having an existing dairy which is both well-sited and large enough to accommodate a storage vat of the required size, there are many more where it will be necessary to enlarge the existing building or to provide a new one in a more suitable position.

### Access

The rear of the bulk milk tanker will need to approach to within 20 ft of the outlet point on the bulk vat and access to the dairy should be made as easy as possible for the driver. It is desirable that the outlet of the vat should be opposite the door to allow for easy connection of the flexible hose from the tanker. Alternatively, a small opening 12 in. sq. for the hose to pass through can be provided at floor level with the flap outside the dairy.

The 2,500 gallon articulated tankers sometimes used for bulk collection are 32 ft long, 7 ft 6 in. wide and 10 ft 6 in. high, with a turning circle of 68 ft and a gross vehicle weight of 21½ tons. Any bridges, cattle grids, etc., on the access road should be carefully checked to ensure that they will carry a fully-laden tanker, and the road itself should be repaired and improved where necessary to prevent it from being churned up during bad weather. Six inches of concrete, reinforced as necessary, on a good hardcore base is the only lasting solution to this problem, but well-consolidated hardcore will serve adequately if it is properly maintained and any potholes that appear are quickly repaired. A minimum width of 10 ft should be allowed for the access road, but 12 ft should be considered as this would provide a margin to minimize damage by heavy wheel loads to the edges, which often become weakened by surface water drainage, and to withstand corner cutting by the trailing wheels of articulated vehicles.

## The dairy

The size of dairy required will depend on the dimensions of the tank to be installed, but a minimum of 2 ft 6 in. clearance should be allowed around the tank to make cleaning easier and allow good access to other equipment and facilities in the dairy.

## Dairy floor

The floor must be strong, impervious and in good repair before the vat is installed. (It is very much easier to carry out repairs before the tank is installed than it is afterwards). A concrete floor, laid to suitable falls, made with a 1:2:4 mix is best and it can incorporate a layer of granolithic paving for extra hard wear. A thickness of 6 in. is required to carry the load where the vat is to stand. Even a vat of 200 gallons capacity will weigh more than a ton when full and any movement in the floor after calibration will result in wrong readings being obtained from the dipstick, involving expensive re-calibration.

## Walls

New walls may be constructed of either 9 in. brickwork or concrete blocks. Such walls should be cement rendered smooth internally, suitably cladded or painted to give a surface that is hard, impermeable and readily cleaned. Any equipment, such as receiving jars, which is likely to be in an awkward position once the tank is installed must be re-sited.

## Roof

Asbestos cement sheeting is the best material for the dairy roof, but whatever material is used it must provide an impervious and dust-free surface. Where there is a loft floor above the dairy a ceiling can be provided by fixing some proprietary form of insulating board to the underside of the floor joists, provided it is dust proof and resistant to condensation. Care should be taken to allow sufficient room between the top of the vat and the ceiling for calibration to take place. The height required varies and the manufacturer's advice should be sought.

## Lighting

The window area in the dairy should be approximately equal to 1/10th of the floor area. If rooflights are used they must be placed so as to avoid direct sunlight falling on to the bulk vat. A deadlight placed between the parlour and the dairy may prove an advantage in allowing the operator to keep an eye on the dairy equipment without leaving the parlour. If there is a likelihood of night collections a light fixed outside the dairy will be useful.

## Doorway

The dairy door should be a minimum of 6 ft wide, preferably 6 ft 6 in. to allow the vat to be brought in easily. Where an existing dairy is being used many farmers knock out the doorway to get the vat in and then rebuild it, thus avoiding the cost of a new door. This may prove a false economy if the original vat needs to be replaced in the future.

## Refrigeration unit

This must be housed in a position where there is a good supply of air but which is not in direct sunlight. This can be achieved by siting the unit on a 6 in. concrete pad against an outside wall and providing it with a waterproof wooden cover with louvred sides. It must, however, be protected from possible damage by farm machinery and for this reason is best sited in a corner, where it is well out of the way.

## Summary

Vats are frequently installed hurriedly in order to meet the deadline for the start of a new bulk milk round; but anyone who installs in haste will undoubtedly repent at leisure, unless some considerable forethought is used. Ensure, in particular, that any new building, or adaptation of an existing one, will comply with the requirements of the Milk and Dairies (General) Regulations and that advantage is being taken of all the benefits of reduced labour requirements where such a large capital investment is being made.

Useful advice on the requirements for a farm dairy is given in Fixed Equipment of the Farm leaflet No. 3—*Farm Dairies.**

*From Her Majesty's Stationery Office or through any bookseller, price 2*s.* (10p) plus postage.

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### 'Queen's Prize' Winner, 1970

This year's 'Queen's Prize', awarded annually by the Royal Agricultural Society of England to the candidate securing the highest number of marks in the National Diploma in Agriculture examination in the United Kingdom, has been won by Mr. Andrew Percival Casebow, 4 Queensway, Dymchurch, Romney Marsh, Kent, a student of the Royal Agricultural College.

The 'Queen's Prize' was instituted by the R.A.S.E. to mark the occasion of the Queen's Presidency of the Society in 1954 and of the Royal Show of that year being held in Windsor Great Park.

Mr. Casebow is 23 years of age. After leaving school he worked for more than two years for a local Kentish farmer as well as on his father's farm. He entered the Royal Agricultural College in 1968 on a two-year course.

## FOOD HYGIENE ON THE FARM

Certain provisions of the new Food Hygiene Regulations, designed to ensure cleanliness and hygiene in food premises, will apply for the first time to the business of packing or storing of eggs, fruit or vegetables on the farm. When carried out as part of general wholesaling and retailing of food, these operations have been subject to all the requirements of the Regulations for many years, but similar operations carried out within the farm itself have not.

The new Regulations (the Food Hygiene (General) Regulations 1970) will come into force on 1st March 1971, and will apply in England and Wales. The provisions which relate to farm premises will not be difficult to comply with. They will impose certain basic hygienic principles, which may be summarized as follows:

(*a*) Articles or equipment with which food comes into contact must be kept clean and in good condition.

(*b*) Food must not be placed where it can be contaminated.

(*c*) Good food must be kept separate from bad food.

(*d*) Food handlers must keep themselves and their clothing as clean as is reasonably practicable. They must keep covered with a suitable waterproof dressing open cuts and abrasions that are exposed. They must not spit; and they must not smoke or take snuff when they are handling open food or are in a food room where there is open food.

(*e*) Adequate steps must be taken to prevent food in transit coming into contact with any article which may contaminate it or with any live animal or poultry.

(*f*) The paper or other material used for wrapping or the containers of any open food must be clean. In most circumstances, any printed paper or material coming into direct contact with the food must be designed for wrapping or containing food. This, in effect, very largely prohibits the use of newspaper as an inner wrapping.

(*g*) A food handler must inform his employer immediately he knows that he is suffering from any disease which might cause food poisoning and his employer must notify the appropriate Medical Officer of Health.

(*h*) A supply of clean and wholesome water must be provided to enable the Regulations to be complied with.

The Regulations will be enforced by local authorities. Anyone wishing to obtain advice about compliance with the Regulations should get in touch with the local Public Health Department.

Copies of the Food Hygiene (General) Regulations 1970 (S.I. 1970 No. 1172) may be obtained from H.M. Stationery Office or through booksellers, price 2*s.* (by post 2*s.* 4*d.*).

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## TAKE CARE WITH YOUR GUN

Every year farmers, farm workers and others are killed and injured because loaded guns are being carried on tractors, farm machines and vehicles. Movement of a vehicle or machine over uneven ground can cause a loaded gun to fall or to be jolted enough to cause it to go off. Do not rely on the safety catch as it may not be entirely foolproof—a gun is only safe when it is unloaded.

Damaged and defective guns, and those with exceptionally light trigger pressures, are likely to go off when least expected. Remember, guns are for killing—but don't let them kill you!

# in brief

- **Cereal growing: 1970 pattern**
- **Strategy in pest control**

### Cereal growing: 1970 pattern

THE regional incidence of corn growing in Britain has been undergoing a steady and important change during the past ten years or so, becoming more strongly marked in the eastern half of the country but spreading outwards into adjacent counties as suitable land becomes more and more difficult to find in the traditional corn-growing areas. In the latter areas the allied problems of continuous cropping and shortage of additional land for cereals have slowed down their rate of growth, while in counties in the Midlands and South, the North-East and in Perthshire and Aberdeenshire cereal growing has expanded rapidly. By 1977 it is expected that the intensity of cereal growing in these counties will have achieved a level little, if anything, below that of the long-serving arable areas of eastern England. In the western parts of Britain, on the other hand, the trend in cereal production has moved in the opposite direction—where acreages have not actually declined, they have at best remained static.

It is of interest to recall that a century ago cereal growing was widespread throughout the country, with most counties having 20–40 per cent of their crops and grass acreage under a cereal. But emerging from the interplay of physical, technical and economic factors, especially during the past twenty-five years, corn growing has coalesced into well-defined areas, with barley for a number of years to the fore and oats at the bottom of the poll.

A study* of this fresh facet of grain growing in Britain, published by the Home Grown Cereals Authority under the authorship of Dr. Basil Cracknell, comes as a supplement to the Britton Report and examines in greater detail the comments made by the county agricultural advisers at that time. The importance of regional differences is seen in the variation of cereal use—more often as a cash crop in the east and a feed crop in the west—which implies a varied reaction to a given stimulus. Thus, as Dr. Cracknell points out, if cereal prices fall the big specialist cereal growers in East Anglia may try to step up production to maintain their level of income, but livestock producers in the west may revert to purchased feed. Similarly, attitudes to new developments in production and marketing will differ, e.g., if the technical optimum size of a production unit is increasing, specialist cereal growers will tend to increase their acreage as much as possible to secure the maximum economies of scale, whereas livestock farmers may decide to give up cereal growing altogether; likewise, regional variations in climate bring different attitudes to such problems as crop drying, the incidence of diseases, transport and the choice of break crop.

Regional emphasis on corn growing may be traced to the middle '40s and the subsequent impetus given to it by the popularity of barley for young beef. For several reasons cereals have had a greater financial attraction than other enterprises, not least because of the low capital cost involved; and as dairy farming has become more intensive and released land for other uses, opportunities have arisen enabling advantages to be taken of scale.

*_Past and Future Cereals Production in the United Kingdom_. Price 8s. from the Home Grown Cereals Authority, Haymarket House, Oxendon Street, London, S.W.1.

As a result of the changing pattern of the corn-growing areas of the '70s and anticipated higher production from new areas, some not insubstantial adjustments in marketing will inevitably be called for. West of England merchants may expect to face a greater reduction in their throughput of grain than they have experienced hitherto. In other areas, particularly in the Midlands and South, a marked increase in the quantity of grain to be handled indicates an increased business potential. Another result may well be to encourage the present tendency for feed and flour mills and integrated feed/livestock units to be sited inland.

**Strategy in pest control**

THE teeming millions of the largely unseen world of insect life are given little thought until they cross the path of man and in particular threaten his crops, stock or the health of man himself. At this point they are indicted as pests and, like Cain, have every man's hand against them. Certainly, they are an expensive burden in terms of unremitting research and chemical control—though, incidentally, they have founded some flourishing industries! But amongst that prolific winged and crawling kingdom there are many species that qualify as allies rather than enemies—the pollinators, the predators and the parasites.

The specific use of predators and parasites to help in pest control has had some notable successes, both at home and overseas, but since the middle '40s chemicals have overwhelmingly constituted the first line of attack against what has been called 'the rival world'. The benefits in field and glasshouse and in stored produce can be measured in millions of pounds, but not all has been gain since, apart from problems associated with the danger to foodstuffs by toxic residues, pesticides do not discriminate between harmful and beneficial insects or other forms of wild life; nor does their effectiveness persist against some pests from generation to generation. In these circumstances we may expect greater attention to be given to a more subtle and varied approach, such as the kind of integrated control being pursued at the Glasshouse Crops Research Institute referred to in this column last month.

The new edition of the Ministry's bulletin *Beneficial Insects and Mites** comes opportunely as a guide to the discrimination between insect friend and foe and to the techniques that could be employed to reduce the pest hazard that faces farmers and growers perennially. Its author, B. D. Moreton, N.A.A.S., Wye, suggests that pesticides will be used more critically 'at the right place and the right time, and in the context of carefully worked out programmes'. The biologist's contribution would include crop diversification to prevent too great a build-up in pest populations at particular sites, or the use of plant varieties having a natural resistance to certain pests. Sex attractant chemicals to trap specific species, chemosterilants to induce sterility, and other chemicals which have the effect of disturbing normal behaviour of 'target' insects also have a part to play in addition to the deliberate introduction of predators, parasites and disease organisms. The use of more selective chemicals, or applying the less selective at times when the pests' natural enemies are more resistant, and restricting the placement of chemicals and leaving areas untreated to serve as pockets in which predators and parasites may multiply, are also some of the means by which chemical and biological control can be integrated.

*AGRIC.*

*H.M. Stationery Office. Price 17*s.* (by post 17*s.* 8*d.*)

# Books

**Guide to Safety in Agriculture.** International Labour Office, 1969. 24*s*. [£1·20].

This Guide advises on a wide range of subjects in the field of farm safety and it points out that agriculture is the world's largest industry, employing several hundred million persons. While it is not possible to say how many accidents happen every year, the number is certainly very large and in many respects agriculture is a dangerous industry.

Increased mechanization in Britain has resulted in an increased number of accidents and when we look at the United States and Europe, this seems to be a common pattern. It will, therefore, be surprising if the same experience is not met within developing countries, unless definite measures are taken to prevent it. This is where the Guide can be of great help to those who have to deal with farm safety matters. With its extensive coverage, including such subjects as farm buildings, all types of machinery, electricity, driers and silos, pressure vessels, hand tools and ladders, dangerous substances, blasting, fire fighting, ergonomics and protective clothing, it contains a wealth of information and advice which, if understood and followed, will prevent accidents occurring.

The Guide is well written and makes extremely interesting reading. It includes some sixty-eight illustrations of different aspects of farm safety, from guarding the edge of a floor, to how to lead a bull. In 1967, the International Labour Office published a *Code of Practice of Safety and Health in Agricultural Work* and now suggests that it may serve as a handy companion to the Guide. It seems to me that both are intended for, and will be used as, instructional and reference books. I agree very much with the committee of experts responsible for the Guide when they express the hope that it could be consulted with advantage by teachers in the field of agriculture, Government departments, designers and manufacturers of agricultural machinery and buildings, employer and worker organizations, public authorities and all organizations responsible for safety who have the interests of agriculture at heart.

*J.C.W.*

**The Veterinary Annual 1969.** Edited by C. S. G. GRUNSELL. John Wright & Sons Ltd., 1970. 65*s*. [£3·25].

Now in its tenth year of issue the Veterinary Annual appears under fresh editorship, Professor C. S. G. Grunsell of Bristol University taking over—in mid-stream as it were—through the sudden death of Mr. W. A. Pool, its previous editor and originator.

This edition therefore follows the previous pattern inasmuch as just under a third of the text (9 separate articles) comprises the Current Developments Section and the remainder consists of the well established Review Section, New Drugs and Appliances, New Publications and the comprehensive Index.

The articles chosen to reflect current developments are interesting and informative and several are highly topical. For example, J. B. Brooksby of the Animal Virus Research Institute sets out the laboratory investigations done at Pirbright at the time of, and subsequent to, the foot-and-mouth disease epidemic in 1967/68. This can usefully be read in conjunction with the recently published Northumberland Committee Report. Similarly, there is a highly topical article on Marek's Disease by L. N. Payne of the Houghton Poultry Research Station which emphasizes, particularly, the laboratory aspect of recent developments in connection with this scourge of poultry. Again this article fits in well with the recent announcement of current trials with a Marek's vaccine.

The review section proper follows previous lines. The names of several contributors are becoming familiar to regular readers and the Annual would somehow seem not quite the same without for example C. D. Wilson on Mastitis, T. E. Gibson on Helminthology or T. K. Ewer on Animal Husbandry. These articles, and many others like them, form the meat of this publication and no simpler, quicker or easier method exists for non-specialists wishing to keep up to date with veterinary progress than to read the Review Section of it annually.

*A.H.H.*

**Milk Production.** C. S. BARNARD, A. H. SCOTT and R. J. HALLEY. Iliffe, 1970. 65*s*. [£3·25].

An up-to-date book on milk production, particularly one with a strong farm management bias, has been needed especially at the diploma level of teaching for many years. The authors have supplied this in a form which will make it useful for farm institute teaching and for those directly concerned with practical milk production who wish to improve their knowledge of the economic and technical background of the subject.

The book differs from its predecessors because each author has dealt with a sector of the subject quite independent of his co-authors. This has resulted in fully two-thirds on the farm management and organizational aspects of the subject with only one-third, and the last third at that, on technological aspects of breeding, feeding, milk composition, etc. Many readers will feel that this arrangement has led to some lack of balance. There are no less than thirty-eight pages on the use of labour at milking time but there is not a page on the construction and mechanical operation of the milking machine.

The first part on management in milk production is informative and easy to follow on the principles involved because of the numerical examples given at all stages. A few of these examples are perhaps over simple. In table 2.1 it seems that an extra 11½ lb of concentrates should be fed to achieve the fifth gallon, irrespective of the fact that this would require a daily consumption of 34 lb of concentrates; there is little reference to the long-term effects on yield and liveweight of feed increments of this order. The author of this section might well confer with his co-author who in part 3 suggests 4½ lb for the fifth gallon.

The second part on labour organization and work requirements is a little out of line with the first and third parts, because it deals with a more complicated subject sometimes in considerable detail. For the ordinary agricultural student the absence of descriptions of the basic layouts oe milking installations is likely to make thf data more difficult to follow. This part will be useful to the specialist, but for the student in general agriculture and dairying, a brief statement of principles involved might be more useful.

The third part is an excellent up-dating of the traditional aspects of dairy husbandry-breeding, feeding, lactation, milk quality, etc. The author has taken an objective and scientific approach to the subject. He has even succeeded in treading a delicate path through the maze of suggestions about practical feeding standards, which have arisen partly from the need to change the terms used in describing energy requirements.

*A.S.F.*

## books received

*Agricultural Co-operative Organisations in the E.E.C.* Copies from the Co-operative Planning Unit, Central Council for Agricultural and Horticultural Co-operation, Hancock House, Vincent Square, London S.W.1. Price 15*s*. (post free). 1970.

*An Economic Study of Pig Production in South West England 1968/69.* Estelle Burnside and R. C. Rickard. Department of Agricultural Economics, University of Exeter, 1970. 5*s*.

*Report on the Market Development Scheme 1967-1970.* Copies from the Chief Executive Officer, Agricultural Market Development Executive Committee, Hancock House, Vincent Square, London S.W.1.

*Co-operation and the Potato Market.* E. T. Gibbons. Department of Agricultural Marketing, University of Newcastle upon Tyne, 1970. 15*s*.

*Tables of the Amino Acids in Foods and Feedingstuffs (Second Edition).* D. Harvey. Commonwealth Agricultural Bureaux, 1970. 40*s*.

*Profitability of Farming in the North of England, 1968-69. Results for Selected Groups of Farms.* S. Robson. Department of Agricultural Economics, University of Newcastle upon Tyne, 1970. 3*s*. 6*d*.

*Plant Agriculture.* Readings from *Scientific American.* Selected and Introduced by Jules Janick, Robert W. Schery, Frank W. Woods and Vernon W. Ruttan. W. H. Freeman and Company Ltd., 1970. Price 42*s*. (paper cover) or 94*s*. (cloth cover).

*Isotope Techniques for Studying Animal Protein Production from Non-Protein Nitrogen.* International Atomic Energy Agency, Vienna, 1970. Copies supplied by H.M.S.O. Price 16*s*. 8*d*.

*Wye College, Department of Hop Research Annual Report for year ended 31st March, 1970.* Copies from the Secretary, Wye College, Nr. Ashford, Kent. Price 8*s*.

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